DEPRESSION AND ANXIETY SYMPTOMS AMONG ADOLESCENTS WITH EPILEPSY IN ACCRA, GHANA

Selasie Nana Ama Addom
MBChB (University of Ghana Medical School)
Matric Number: 183530

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Declaration

I declare that the information in this dissertation is true and it is original research conducted in partial fulfillment of the requirements for a Master of Science degree.

Signature: Date:

Selasie Addom

Certification

Supervisors

I declare that I have read this dissertation and it is original research conducted by the student.

Signature

Date….....

Dr IkeOluwa A. Lagunju
Department of Paediatrics,
College of Medicine, University of Ibadan
Ibadan, Nigeria.

Signature ……

Date ….....

Dr Tolulope Bella-Awusah
Department of Psychiatry,
College of Medicine, University of Ibadan
Ibadan, Nigeria.

Dedication

Dedicated to David and Kekeli; thank you for doing this with me every step of the way.

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Abbreviations

ADHD: Attention Deficit Hyperactivity Disorder

ALS: Amyotrophic Lateral Sclerosis

ASD: Autism Spectrum Disorders

BAI: Beck's Anxiety Inventory

BDI: Beck's Depression Inventory

CAE: Childhood Absence Epilepsy

CPS: Complex Partial Seizure

DSM IV: Diagnostic and Statistical Manual of Mental Disorder IV

DSM IV-TR: Diagnostic and Statistical Manual of Mental Disorder IV Text Revision

EEG: Electro Encephalogram

GAD: Generalized Anxiety Disorder

GBD: Global Burden of Disease

ILAE: International League against Epilepsy

IQ: Intelligence Quotient

MS: Multiple Sclerosis

OCD: Obsessive Compulsive Disorder

OPD: Out Patient Department

TLE: Temporal Lobe Epilepsy

WHO: World Health Organization

Abstract

Background: Epilepsy is one of the most common chronic conditions and the most prevalent neurological disorder of childhood. It is known to be associated with high rates of mental health problems, with anxiety and depression being among the most common. There is a dearth of literature on mental health in Ghana and even more so in child and adolescent mental health. The aim of this study was to determine the prevalence of anxiety and depressive symptoms among adolescents with epilepsy in Accra, Ghana.

Methodology: Cross- sectional study design was used and total enumeration of adolescents who met the study criteria was done. Participants were recruited consecutively. Adolescents with epilepsy (10 to 19 years) were screened for symptoms of anxiety and depression using Beck's anxiety Inventory (BAI) and Beck's depression Inventory (BDI). Participants were surveyed in 2 psychiatric hospitals and 2 two neurology clinics. Data on previous diagnosis and treatment of depression or anxiety was obtained from participants' clinical folders. Data obtained was analyzed using the Statistical Package for Social Sciences software version 16. The proportion of adolescent with epilepsy who screened positive for anxiety and depression based on cut off scores on the BAI (scores > 10) and BDI (scores > 17). respectively; was determined. The association between anxiety and depression and selected demographic characteristics and seizure variables was described.

Results: A total of 61 participants were surveyed, 31 males and 30 females between the ages of 10 to 19 years. More than half of the participants (57.4%) had BAI scores that met the cutoff criteria for anxiety, 30.5% had BDI scores that met the cut off criteria for depression and 25.4%

met the criteria for both. The study found no significant association between age and depression or anxiety. No significant association was found between sex and anxiety or depression. Depression and anxiety were however found to be more prevalent among females than males; 37% of females screened positive for depression compared to 23% of males and 67% of females screened positive for anxiety compared to 48% of males. The prevalence of anxiety was found to be higher among younger adolescents (64%) compared to older adolescents (56%) whereas the prevalence depression was higher among older adolescents (33%) compared to younger adolescents. There was no significant association between seizure variables (seizure type, onset of seizures, duration of epilepsy, seizure frequency and type of therapy) and depression and anxiety. It was however observed that, participants who had complex partial seizure type had higher a prevalence of both conditions compared to the prevalence among other seizure types. Participants with ongoing seizures were also found to have higher prevalence of depression and participants on polytherapy were observed to have a higher prevalence of anxiety. It was also observed that only one patient had a previous diagnosis of depression/anxiety and none of the participants was receiving any form of mental health care.

Conclusion: Depression and anxiety symptoms are common among adolescents with epilepsy in Accra, Ghana however these are not often recognized.

Key words: Epilepsy, adolescents, depression, anxiety

Word count: 495

CHAPTER ONE

INTRODUCTION

1.1 Background

Epilepsy is one of the most common chronic disorders. It affects about 50 million people worldwide about 80% of whom live in developing countries (WHO, 2005). There are 24 to 53 new cases of epilepsy per 100 000 population annually in developed countries and 49.3 to 190 per 100 000 for developing countries (WHO, 2005). It is associated with a high burden on individuals and households due to its associated morbidity and financial burden due to cost of treatment and loss of work opportunities especially in developing countries (WHO, 2005). Epilepsy is associated with significant psychosocial stress due to the stigma associated with the disorder (WHO, 2005). It also results in high burden at community or population level through loss of earnings as a result of morbidity and mortality as well as cost of resources used in prevention and treatment (WHO, 2005). Epilepsy accounts for 1% of the global burden of disease (WHO, 2005).

Several studies have documented evidence of an increased prevalence of behavioural problems among children with epilepsy as compared to children in the general population and children with other chronic disorders (Davies et al., 2003; Lavinge and Faier-Routman, 1993). The prevalence of mental health conditions among children and adolescents with epilepsy varies widely from studies done on the different continents of the world over the years. This depends on the population involved and study methodology. A systematic review of literature covering a 10 year period (1996-2007) by Plioplys et al (2007) found prevalence rates of 37% to 77%. Lagunju et al (2012) in Nigeria found prevalence of 46.6% among 84 children and adolescents (5-18

years) with epilepsy in a clinic-based study. Ott et al (2003) in the USA found a prevalence rate of 60% among 114 children and adolescents (5 to 16 years) with complex partial seizure and childhood absence seizures. Davies et al (2003) in a population of 10,483 British children (5-15years), 67 (0.6%) had epilepsy and 37% of the children with epilepsy had psychiatry disorders.

Anxiety and depression are among the most prevalent psychiatric conditions in children and adolescents with epilepsy (Plioplys, 2003, Piazzini et al., 2001). The prevalence rates may be as high as 48.5% for anxiety disorders and 33.1% for depression reported in some studies (Alwash et al., 2000, Adewuya et al., 2005). Studies have been done to determine the association between these disorders and seizure variables and certain demographic characteristics. Alwash et al (2000) in their study involving 101 epilepsy patients (Jordanian adolescents 12 to 24 years) and equal numbers of controls found that anxiety and depression symptoms were more prevalent in patients who had medically uncontrolled seizures. Caplan et al (2005) found higher prevalence of anxiety and depression or co-morbid anxiety and depression in patients with complex partial seizures than childhood absence among a study population of 171 children and adolescents (5 to 16years) in the USA.

Although anxiety and depression are relatively common conditions among patients with epilepsy, they often go unrecognized and untreated.

1.2 Problem Statement

Epilepsy is a common disorder in Ghana like in other developing countries. This is due to the presence of some of the risk factors for epilepsy which are common to sub-saharan Africa such as infectious diseases like malaria and meningitis, prematurity, neonatal hypoxia and head injuries. Commey (1995) found that children with epilepsy made up 3% of out-patients seen at

the paediatric unit of the Korle-Bu Teaching Hospital over a 10 year period. Children with epilepsy also constituted 51.5% of all patients who were enrolled into child neuropsychiatry clinic. Epilepsy results in significant psychosocial and mental health problems which are known to be associated with certain demographic and clinical characteristics. This is also the case in children and adolescents as epilepsy is the most prevalent neurological condition in childhood. There is very few published research work on the mental health problems among children and adolescents with epilepsy from sub-Saharan Africa. In Ghana, published research work on mental health in general is limited as reported by Read & Doku (2012), who found that over a period of 54 years (1955 to 2009), there were 98 published research articles on mental health from Ghana. Many of the studies were small scale and with speculative conclusion (Read & Doku, 2012). Out of the 98, 66 papers were reviewed and none was on mental health of children.

Depression and anxiety disorders are among the mental health conditions that occur in children and adolescents with epilepsy. However, the exact burden in most developing countries is unknown and Ghana is no exception.

1.3 Justification and Relevance of the Study

There is a dearth of literature on mental health and related conditions in Ghana. This scarcity of literature is even more for child and adolescent mental health especially as there is currently no established mental health service for children and adolescents. Available published work has no data on mental health conditions among children and adolescents with epilepsy in Ghana although epilepsy is a common disorder. Therefore, this study aims at determining the prevalence of anxiety and depression among adolescents with epilepsy and the association with certain demographic and seizure characteristics.

Findings from this research will provide useful information for planning mental health services for children and adolescents with epilepsy in Ghana.

1.3 Aims and Objectives

1. 3.1 Aim

The aim of this study is to determine the prevalence of anxiety and depression among adolescents with epilepsy in Accra and to determine their associations with selected demographic characteristics of patients and seizure variables.

1.3.2 Objectives

1. To determine the prevalence of anxiety disorders and depression among adolescents with epilepsy in Accra, Ghana.
2. To determine the associations between anxiety and depression and seizure variables and selected demographic characteristics of patients.
3. To determine the proportion of participants who had received any form of mental health care for anxiety or depression

1.4 Research Questions

1. What is the prevalence of anxiety disorders and depression among adolescents with epilepsy in Ghana?
2. What is the association between anxiety/depression and demographic characteristics and seizure variables?
3. What is the proportion of participants who had received any form of mental health care for anxiety or depression?

1.5 Outcome Measures

The primary outcome measure in this study is the prevalence of anxiety disorder and depression among adolescents with epilepsy in Ghana.

A secondary outcome measure is the mental health care received by adolescents with epilepsy who also have an anxiety disorder or depression.

Word count: 1,081

CHAPTER TWO

LITERATURE REVIEW

2.1 Epilepsy: Definitions, Classification and epidemiology

2.1.1 Definitions

Epilepsy is a disease of the brain. It is defined as at least two unprovoked or reflex seizures occurring more than 24 hours apart (Fisher et al., 2014). It may also be defined by the occurrence of one unprovoked or reflex seizure with the probability of a further seizure similar to the general recurrence risk (which is at least 60%) after two unprovoked seizures occurring over the next 10 years (Fisher et al., 2014). The diagnosis of epilepsy may also be made in the presence of an epilepsy syndrome (Fisher et al., 2014). A seizure is the occurrence of signs and symptoms due to abnormal excessive synchronous neuronal activity in the brain (ILAE, 2014). The occurrence of a seizure is not equivalent to a diagnosis of epilepsy (ILAE, 2014).

A provoked or reactive seizure occurs as a result of a transient factor acting on an otherwise normal brain to temporarily lower the seizure threshold. Such seizures do not qualify for a diagnosis of epilepsy (Fisher et al., 2014). Reflex seizures occur in response to certain stimuli for example light flashes (Panayiotopoulos 2005). When these seizures are recurrent, they are considered as epilepsy because they are associated with a predisposition to having such seizures (Fisher et al., 2014). Unprovoked seizures occurring within 24 hours are considered as conferring the same risk of recurrence as a single seizure hence does not qualify as epilepsy (Neligan et al., 2012). A diagnosis of epilepsy is also allowed in situations where after a single unprovoked

seizure and there is a high risk of recurrence for example in a child with a structural brain aetiology or an unprovoked seizure occurring a month after a stroke (Hesdorffer et al., 2009)

Epilepsy syndromes are epilepsies characterized by a group of unique signs and symptoms other than just seizure type (Engel 2006, Engel 2001). They often have specific ages of onset, EEG features, and seizure types and often have implications for prognosis and management. (Berg et al., 2010)

2.1.2 Classification

The International League against Epilepsy (ILAE) classifies epilepsy into two broad groups; generalized and focal seizures; with focal seizures replacing the old term partial seizures (Berg et al., 2010, Engel, 2006). ILAE defines generalized seizures as which seizures originate within and rapidly engage both sides of the brain (Engel, 2006). They may involve cortical and sub-cortical structures of the brain but not necessarily involve the entire cerebral cortex and can be asymmetrical (Engel, 2006).

Generalized seizures are further divided into seizures with tonic clonic manifestations, absence seizures, myoclonic seizures, tonic seizures, clonic seizures, epileptic spasms and atonic seizures (Engel, 2006). Generalized seizures with tonic-clonic manifestations formerly known as grand mal seizures may occur as tonic-clonic or clonic-tonic-clonic (Engel 2006, Berg et al., 2010). Absence seizures typically occur as sudden onset of unresponsiveness sometimes with a blank stare, associated with brief upward rotation of the eyes (Rudzinski & Shih, 2011). There is often no postictal confusion and patient resumes activity being carried out before the seizure event (Rudzinski & Shih, 2011). The events often last for few seconds and they can be stimulated by hyperventilation or occasionally by photic stimulation (Rudzinski & Shih, 2011). Atypical

absence seizures have less abrupt onset, last less than 10 seconds but can be prolonged leading to absence status (Rudzinski & Shih, 2011). They are usually not induced by hyperventilation (Rudzinski & Shih, 2011). Absence seizure may also present with special features; myoclonic absence and absence with eyelid myoclonia (Berg et al., 2010). Clonic seizures are fast rhythmic seizures which may or may not be associated with impaired consciousness (Engel, 2006). They are repetitive, occurring in cycles of about 2 to 3 per second, usually involve the same muscle group and are prolonged (Blume et al., 2001). Tonic seizures are generalized seizures characterized by bilateral increased tone in the muscles of the limbs lasting seconds to a minute (Blume et al., 2001). It often occurs in Lennox Gastaux syndrome and sometimes in myoclonic seizures (Engel, 2006). Myoclonic seizures are sudden brief involuntary contraction of muscle or muscle groups (Blume et al., 2001). Epileptic spasms (formerly known as infantile spasms) are characterized by sudden flexion or extension or mixed flexion and extension of predominantly proximal or truncal muscles (Blume et al., 2001). The contractions are more sustained than myoclonic but not as sustained as tonic seizures (Blume et al., 2001). Atonic seizures are characterized by sudden loss of muscle tone not preceded by a tonic or clonic event. (Blume et al., 2001)

Focal Seizures originate from one hemisphere and may be localized or spread through the ipsilateral or contralateral hemisphere and can originate from sub-cortical structures (Berg et al., 2010). They are no longer classified as simple partial or complex partial seizures (Berg et al., 2010). The features of the seizure however may allow for the localization the part of the brain involved in onset and progression of the seizure (Berg et al., 2010). Motor features are characteristic of seizures originating from the precentral gyrus which can remain localized or spread through the motor cortex resulting in complex movements such as the Jacksonian seizure

(Rudzinski & Shih, 2011). Focal features from other parts of the cerebral cortex have features related to the functions of that area; seizures originating from the temporal lobe present with auditory hallucinations (Rudzinski & Shih, 2011). Those originating in the post-central gyrus have somatosensory features such as localized paraesthesia, warmth and electric shock-like sensation which can also spread (sensory Jacksonian seizure). Focal seizures may also involve the autonomic nervous system resulting in symptoms such as vomiting, urinary incontinence and sweating. Those involving higher cortical centres result in features such as derealization, depersonalization, illusions, déjà vu and jamais vu experiences and may also occur as emotional states such as fear anger and pleasure (Rudzinski & Shih, 2011). Focal seizures may also be associated with impairment of consciousness or dyscognitive features; these were formerly referred to as complex partial seizure (Rudzinski & Shih, 2011, Berg et al., 2010).

2.1.3 Epidemiology of Epilepsy and burden of care

Epilepsy is a common chronic disorder which affects over 50 million people worldwide (WHO, 2005). About 80% of those affected live in the developing countries (WHO, 2005). The prevalence in industrialized nations is 3 to 9 per 1000 (Roman & Senanayake, 1993). Data on the epidemiology of epilepsy in developing nations is inconsistent due to difficulties in study methodologies, incomplete medical records, lack of specialized personelle and equipment, and improper classification of seizures (Preux & Druet-Cabanac, 2005). In some studies, there may be exclusion of some patients resulting in underestimation of the prevalence (Preux & Druet-Cabanac, 2005). Most of the studies in developing countries were conducted in rural communities where there may be under-reporting due to stigma, lack of identification of some seizure types and some patients are banished from their communities due to seizures and hence

are not surveyed (Roman & Senanayake, 1993). On the other hand, small surveys in areas with some specific risk factors such as consanguinity and the inclusion of provoked seizures may result in overestimation of the prevalence (Preux & Druet-Cabanac, 2005). In a review of door-to-door surveys from sub-saharan Africa by Preux and Druet-Cabanac (2005), the median prevalence was 15 per 1000. Some studies reported low prevalence similar to that of the industrialized nations; 5.2 per 1000 from an Ethiopian study (Tekle-Haimanot et al., 1990), while some reported as high as 70 per 1000 from a study in Cameroun (Nkwi & Ndonkwo, 1989).

Majority of the studies in sub-saharan African show a higher prevalence in males: with male-female sex ratio of 1.4 (Preux & Druet-Cabanac, 2005). The age of onset was below 20 years in 60% of cases (Preux & Druet-Cabanac 2005) and the prevalence increases with age with peak prevalence in the second decade (Preux & Druet-Cabanac, 2005). There are disparities in the studies about the predominant seizure type (Preux & Druet-Cabanac, 2005). This is because there are inconsistencies in classification of the seizures; even in clinical studies, due to unavailability of trained personelle and equipment (Preux & Druet-Cabanac, 2005) and in community studies the classification is based on description of seizures as given by immediate kin (Preux & Druet-Cabanac, 2005). The predominant seizure type given by majority of studies in Sub-saharan Africa was generalized tonic-clonic (Preux & Druet-Cabanac, 2005). This is consistent with findings from the developed world (Preux & Druet-Cabanac 2005). Roman and Senanayake (1993) however reported the most prevalent seizure type as partial seizure in their review of literature from developing countries which included 6 studies from Africa.

Risk factors for epilepsy in Africa include the following: peri-natal risk factors such as prematurity, neonatal hypoxia; infections such as malaria, viruses, bacterial meningitis; head injuries from road traffic accidents, work injuries and wars, compounded by the lack of

neurosurgeons in many parts of Africa (Preux & Druet-Cabanac, 2005). Other risk factors are genetic factors in communities where there is high prevalence of consanguinity (Preux & Druet-Cabanac, 2005) and toxic agents such as alcoholism and toxins found in some home remedies (Roman & Senanayake 1993)

Epilepsy is a chronic disease hence is associated with significant burden on patients and their families (WHO, 2005). It is still a misunderstood disorder which carries with it a lot of stigma and discrimination which further impacts greatly on the quality of life of families affected (WHO, 2005). In addition to the above, people with epilepsy are predisposed to other health problems such as fractures from falls, as well as a range of psychosocial problems and mental health conditions which include depression and anxiety disorders (WHO, 2005). Up to 70% of newly diagnosed children and adults with epilepsy can be treated successfully with anti-epileptic medication however three quarters of patients in developing countries and about 9 out of 10 patients in Africa go untreated. (WHO, 2005)

2.2 Epilepsy and Mental Illness

2.2 .1 A historical Perspective

The association between epilepsy and behavioural problems or mental illness has been observed as early as the condition epilepsy has been in existence as evidenced in some early medical records (Wilson-Kinnier and Reynolds, 1990). Some ancient Babylonian texts from 1050 BC showed records of the belief that epilepsy was caused by demonic control or possession by ghosts (Wilson-Kinnier and Reynolds, 1990). This was due to the appearance of the seizures as well as some behaviour changes that were observed (Wilson-Kinnier and Reynolds, 1990). Hippocrates attempted to dispel this myth of epilepsy being caused by demon possession or a

curse from the gods in his book on epilepsy titled *On the Sacred disease* written around 400 BC in which he stated that epilepsy was a disease of natural cause not of divine cause as believed in those days. The myth however continued several decades after, leading to stigma and isolation of patients and their families (Masia and Devinsky, 2000).

As recent as the early 19th century, asylums were built to house both epilepsy patients and the mentally ill (Masia and Devinsky, 2000). However, during the period, the belief that epilepsy was contagious was erroneously confirmed (Esquirol, 1838) as cited Masia & Devinsky (2000). This is probably by the observation of psychogenic seizures among patients who had mental illness (Masia and Devinsky, 2000). This led to the separation of the two groups of patients in the late 1800s leading to the establishment of hospitals for paralyzed patients and persons with epilepsy (Masia and Devinsky, 2000). The institutionalization of patients with chronic epilepsy in Europe during the 19th century led to an increase in the study and documentation of the perceived relationship between epilepsy and mental illness (Reynolds & Trimble, 2009).

Syndenham and Willis came up with the concept of "nervous diseases" as responsible for hysteria and hypochondriasis and departed from the older explanations of wondering uterus (hysteria) and vapours from the liver, spleen and stomach (hypochondriasis) (Reynolds &Trimble, 2009). The concept of nervous disease was further consolidated by Pinel and Cullen by their classification of neuroses which at that time consisted of a mixture of present day psychiatric and neurologic conditions such as convulsions, hysteria and paralysis (Reynolds & Trimble, 2009). In the late 19th century neurology gradually became a separate discipline as previously considered neuroses such as strokes and Parkinson's disease were found to have brain lesions as discovered by psychiatrists who were treating them in mental institutions (Reynolds &

Trimble, 2009). Epilepsy however remained in the domain of psychiatry until the 20th century Reynolds & Trimble, 2009).

2.2. 2 Causes and classification of Mental illness in Epilepsy

Mental illness in patients with epilepsy may be as a result of biologic factors (aetiology or focus of localization), due to the medications (number and types of medication) as well as psychological factors such as stigma (Swinkels et al., 2005). Herman and Whitman (1984) have classified the risk factors for psychiatric disorders in epilepsy into brain related, non-brain related and treatment related. The manifestations of mental illness may also be classified according to their occurrence in relation to the seizures: they may be peri-ictal which are closely associated with the seizure itself, occurring pre-ictal (before the seizure) or post-ictal (occurring after the seizure) and they may also occur independent of the seizure (inter-ictal) (Swinkels et al., 2005). A bidirectional relationship has also been described between epilepsy and depression and psychosis (Kanner and Palac, 2002). The bidirectional relationship between depression and epilepsy was first described by Hippocrates (Lewis, 1934) and confirmed centuries later in a population based controlled study which showed that prior history of depression was associated with a six-fold increased risk of epilepsy (Hesdorffer et al., 2000).

2.2.3 Epidemiology of Mental Illness in Epilepsy

The prevalence rates of psychiatric conditions among adult epilepsy patients reported in literature vary widely from 19 to 80% (Swinkels et al., 2005). Currie et al (1971) in the UK reported a prevalence rate of 44% in a population of 666 hospital out-patients using interviews

and review of clinical records. Schiffer & Barbarian (1984) in the USA compared 402 patients with temporal lobe epilepsy (TLE) to 368 with multiple sclerosis (MS) and 124 with Amyotrophic lateral sclerosis (ALS). They found 29.9% of patients with TLE had psychiatric diagnosis compared to 19.3% and 4.8% in the MS and ALS patients respectively. Fiordelli et al (1993) in Italy found 19% of patients with epilepsy (100 patients and 100 controls) had psychiatric diagnosis using the clinical interview schedule. Gureje (1991) in Nigeria reported a prevalence rate of 37% among 204 outpatients. Among the psychiatric conditions found in patients with epilepsy, anxiety disorders and depression have relatively high rates reported in literature: 15% -25% for anxiety disorders and 11% to 80% for depression (Kanner & Palac, 2002). Psychosis has prevalence rates of 2%- 9% (Kanner & Palac, 2002).

2.3 Epilepsy and mental illness in children and Adolescents

Epilepsy is the most prevalent neurological disorder in children (Sillanpaa & Schmidt, 2006; Fejerman 2002) with a prevalence rate of about 1% in children and adolescents (Fejerman 2002). Children and adolescents with chronic illnesses are at an increased risk of psychosocial morbidity (Rutter et al., 1970; Pless & Pinkerton, 1975). They are 2.5 times more at risk than healthy controls and when the chronic condition involves the central nervous system the risk is further increased (Lavigne & Faier-Routman, 1993, Nassau & Drotar, 1997, Davies et al., 2003). Davis et al (2003) compared prevalence of mental health conditions among children with epilepsy, diabetes and healthy controls in 10,438 children aged 5 to 15 years in Britain and found prevalence rates of 37% in children with epilepsy, 11% in children with diabetes, and 9% in the control group.

The prevalence rates of mental health problems among children with epilepsy range from 37% to 77% from different studies around the world (Plioplys et al., 2007). The wide difference is as a result of differences in methodology of the studies reviewed (Plioplys et al., 2007). Higher rates were reported in studies which used structured interviews involving the parent, child and clinician than in those that used self-report instruments (Plioplys et al., 2007). Prevalence rates are also higher in studies with clinical samples compared to population-based samples (Plioplys et al., 2007). Ott et al (2003) in a sample of 114 children with epilepsy, from a tertiary facility and community clinics in the USA had a prevalence rate of 60%. The instrument used was KSADS which is a structured interview guide based on the DSM IV criteria. Davies et al (2003) used population data from Britain involving 10,438 children and adolescents 67 (0.6%) of whom had epilepsy and found prevalence of 37% using structured interviews based on the DSM IV criteria. Lagunju et al (2012) studied a clinic-based sample of 84 children with epilepsy aged 5years to 18 years in Nigeria. The prevalence of behavioral problems was 46.6% using the Rutter scale which is a screening tool.

Theories about the aetiology of psychopathology in children with epilepsy propose a complex interaction between multiple variables to be responsible (Kraemer et al., 2001). Some risk factors are epilepsy related and others are non-epilepsy related (Plioplys et al., 2007). Among seizure related risk factors, higher seizure frequency although not considered independent risk factor, it is however associated with lower IQ scores, poor attention and language skills (Kolk et al., 2001; Nolan et al., 2003). Data on the casual effects of anti-epileptic medication on cognitive and behavioural problems in children with epilepsy is inconclusive (Plioplys et al., 2007). There is evidence that antiepileptic medication can adversely affect behaviour and cognitive function however in majority of patients these changes are not clinically significant (Bourgeois, 1998). In

terms of non-seizure related risk factors; the child's age, sex and socio-economic factors have not be consistently associated with an increased risk of mental health problems (Austin et al., 2000; Hoie et al., 2006). Cognitive and language deficits and family risk factors have been consistently found to be associated with psychopathology (Davies et al., 2003, Caplan et al., 2004). Family related risk factors include a family history of psychopathology as found in the general population of children and adolescents (Plioplys et al; 2007). Over-controlling parenting and poor parent-child relationship are associated with increased risk of psychopathology (Rodenburg et al., 2005, Sbarra et al., 2002)

The following are some of the mental health disorders that are commonly found among children with epilepsy; Attention Deficit Hyperactivity Disorder (ADHD), Autism spectrum disorders (ASD), Anxiety and Depression (Plioplys et al., 2007). Population studies have reported prevalence rates of ADHD among children with epilepsy as 12% to 17% (Dunn et al., 2005; Reilly, 2011) and some studies have reported higher rates; 30% to 40% (Thome-Souza et al., 2004). Children with epilepsy and ADHD have a higher risk of negative school outcomes than those with epilepsy alone (Davis et al., 2010). High rates of Autism Spectrum disorders (ASD) have also been reported among children with epilepsy especially those with associated moderate to severe intellectual disability (Steffenburg et al., 1996; Clark et al., 2005). In a prospective study of children with onset of epilepsy in the first year of life (infantile spasms) 14% were found to have ASD later in life (Saemundsen et al., 2008) and in community-based study by Berg et al (2011) 5% of children with childhood onset epilepsy had ASD compared to about 0.9% in the general population. Psychosis is not commonly reported in children with epilepsy and its presence may point to a structural abnormality or multiple seizure types (Kanner and Dunn, 2004, Lax and Taylor, 2010). Other risk factors for psychosis in children with epilepsy found in

literature include family history of epilepsy, young age at onset of epilepsy and complex partial seizures (Kanner and Dunn, 2004).

2.3 Adolescence: Specific Issues in relation to Epilepsy and Mental Illness

Adolescence is a period transition in physical, social and emotional domains (Guerra et al., 2012). It is a period where there is transition into adult identity (Erickson, 1968). The adolescent develops self-identity and begins to view himself in terms of personal beliefs and standards (Harter, 1998). Adolescents also measure themselves in terms of academics, appearance, social relationships and moral conduct (Masten et al., 1995). It has been found for example that physical appearance is very important for development of self-esteem especially in females (Usmaini and Daniluk, 1997). Adolescence is also associated with an increase focus of attention to peers and less on care givers (Guerra et al., 2012). There is also an increase in risk taking behaviour and experimentation (Guerra and Bradshaw, 2008).

There is a reciprocal relationship between chronic illnesses and development in adolescence; physical and psychosocial adjustments in adolescence affect the disease and the disease also affects development (Suris et al., 2003). Hence poor abstract thinking and planning, and development of autonomy may result in poor adherence to treatment (Suris et al., 2003). In some cases, hormonal changes in adolescence worsen the disease, for example increased metabolic rate in adolescence may affect glycaemic control in diabetes (Suris et al., 2003). Chronic illness in adolescence may result in poor physical growth, impaired sense of physical attractiveness, social isolation and educational or vocational difficulties (Suris et al., 2003).

Epilepsy is the most common neurological condition in adolescence (Appleton et al., 1997, Paolicchi, 2002, MacLeod & Austin 2003). It is known to make the period of adolescence more

difficult to navigate (Reeve & Lincoln, 2002, Smith et al., 2002). It is associated with stigmatization, poor self-esteem, poor peer relationships and impaired independence (Coupey & Cohen, 1984, MacAnarmey, 1985, Gotmaker et al., 1990, Bartzel et al., 1991, Westbrook et al., 1992). Adolescents with epilepsy express worries over participation in competitive sports, driving a car (Clement & Wallace 1990), becoming parents or being successfully employed (Rossi et al., 1997) and some express fear of death from seizures (Mittan, 1986, Calton-Ford et al., 1995). Epilepsy impacts on the formation of independence of adolescents due to its influence on the social, emotional, behavioural aspects of the adolescent's life (Appleton & Neville, 1999). Adolescents with epilepsy experience high rates of stigma and as a result poor health related quality of life (Devinsky et al., 1999, MacLeod & Austin 2003). Stigma, perceived stigma or the fear of stigma results in poor self-esteem, rejection by peers, social isolation and avoidance of certain age appropriate activities (Devinsky et al., 1999, Austin et al., 2002, MacLeod & Austin 2003, Jacoby & Austin, 2007). It also results in lower expectations by caregivers (Kanner & Balabanov, 2002)

2.4 Anxiety disorders and Depression among Children and adolescents with epilepsy

Anxiety and depression are among the most prevalent psychiatric conditions in children and adolescents with epilepsy (Plioplys, 2003, Piazzini et al., 2001). They often occur as co-morbid conditions in children and adolescent with epilepsy and hence have often been studied together (Ekinci et al., 2008). They are however different disorders with distinct symptomatology, eitiology and risk factors (Ekinci et al., 2008).

2.4.1 Depression

Depression is classified as a mood disorder and it may also be referred to as an emotional or internalizing disorder. The following symptoms point to a diagnosis of depression according to the DSM IV-TR criteria; depressed mood, loss of interest in daily activities, weight changes (increase or decrease), sleep changes (poor sleep or excessive sleep), changes in activity level (psychomotor agitation or retardation), decreased energy level, difficulty making decisions, poor concentration, feelings of guilt or worthlessness, persistent thoughts of death, suicidal thought, plans or attempts (DSM IV-TR, 2000). Childhood depression may present with irritability and anger, decline in academic performance (Plioplys, 2003; Weller et al., 2002), phobias, anxiety symptoms, regression behaviour and somatic complaints (Luby et al., 2003, McCauley et al., 1991). Adolescents with depression often present with psychomotor retardation, anhedonia, excessive sleep, hopelessness and drug abuse (Luby et al., 2003, Weller et al., 2002).

The prevalence rate of depression in children and adolescents with epilepsy is estimated to range between 4% and 8% compared to 1 to 3% in the general population of children (Kessler et al., 2001, Birmaher et al., 1996, Lewinshon et al., 1994). Studies from different parts of the world have however reported a wide range of prevalence rates: Ettinger et al (1998) in a study of children and adolescents with epilepsy (in the USA) aged 7 to 18 years found a prevalence of depression of 26%, Caplan et al (2005) in a study population of 171 children and adolescents (5 to 16 years) with complex partial seizures and childhood absence epilepsy, found that 19 % had depression. Alwash et al (2000) in Jordan found prevalence rates of 22.8% for depression among adolescents and young adults (14 to 24 years) with epilepsy. Adewuya et al (2005) in Nigeria found depression among 30.1% of adolescents aged 12 to 18 years with epilepsy.

Depression in childhood and adolescence also occurs commonly with ADHD, conduct disorder and substance abuse with prevalence rates of 40 to 70% further complicating diagnosis. (Rhode et al., 1991, Biederman et al., 1995, Plioplys, 2003)

2.4.2 Anxiety disorders

Anxiety like depression is an internalizing disorder classified under anxiety and stress related disorders in the DSM IV-TR (2000). The following conditions are classified under anxiety disorders in the DSM IV-TR: Panic disorder with or without agoraphobia, panic disorder with a history of agoraphobia, specific phobias, generalized anxiety disorder (GAD), specific phobias, post-traumatic stress disorder, acute stress disorder, obsessive compulsive disorder (OCD), anxiety disorders due to general medical conditions, substance induced anxiety disorder. (DSM IV-TR, 2000)

The prevalence of anxiety in children and adolescents with epilepsy varies from region to region. Examples found in literature are as follows: Prevalence rate of 35% from Nigeria (Adewuya & Okeniyib, 2005), 16% from the United States (Caplan et al., 2005) and 35% from a Jordanian study have been reported (Alwash et al., 2000). High rates of social anxiety and OCD have been reported among adolescents with epilepsy by Baker et al (2005), however GAD is more commonly reported in patients with epilepsy which is often associated with excessive fear of the seizures, fear of negative progression of the disease and the possibility of death (Beyenburg et al., 2005, Choi-Kwon et al., 2003). Caplan et al (2005) found that anxiety disorder among children and adolescents was associated with disruptive behaviour but this was not found with depression.

The phenomenology of anxiety disorders among persons with epilepsy is different from that of the general population. DSV-IV TR criteria require the absence of a physiological condition for anxiety disorder to be considered (DSM IV-TR). However, in epilepsy, the fear of seizures in children may result in separation anxiety, fear of seizures occurring in public may lead to some form of social phobia, and fear of seizure related accidents may lead to agoraphobia (Beyeburg et al., 2005). It has been suggested that a different classification system is considered for anxiety disorders in epilepsy patients (Ekinci et al., 2008).

2.5 Predictors of depression and anxiety in Children and Adolescents with epilepsy

2.5.1 Socio-demographic Factors

Most studies have reported increasing age to be associated with a higher prevalence of anxiety and depression among children with epilepsy; hence both conditions have been found to be more prevalent in adolescents (Oguz et al., 2002, Thome-Souza et al., 2004). However, Caplan et al (2005) found anxiety symptoms were more common among children of younger ages and some studies reported no association between age and anxiety (Adewuya and Ola, 2004, Baki et al., 2004)

The association with gender in literature is not consistent. Caplan et al (2005) reported higher a prevalence of both anxiety and depression in girls while Ettinger et al (1998) reported no significant difference in both conditions between male and female. Austin et al (1992) reported a higher prevalence rate in girls but Hoare & Kerley (1991) found no significant difference. Bilgic et al (2007) found that depressive symptoms were more prevalent among boys in their study among Turkish children adolescents (8 to 16years) but Martinovic et al (2007) found

depressive symptoms more in adolescent girls. In the general population of adolescents, anxiety and depression are more prevalent in females (Ekinci et al., 2008, Birmaher et al., 1996).

Socio-economic status has not been consistently associated with psychopathology in the general population of children and adolescents as well as among paediatric epilepsy patients (Pliopys et al., 2007). However, some studies have reported higher prevalence among those of low socio-economic status and one study from India reported a higher prevalence of behavioural problems among paediatric epilepsy patients from high socio-economic background (Stores et al., 1978, Datta et al., 2005).

Family history of depression has been found in up to 50% of children with epilepsy (Plioplys, 2003) and Thome-Souza et al (2004) found that a family history of psychopathology increases the risk of depression among children and adolescents with epilepsy.

2.5.2 Seizure variables

In relation to seizure type, Ott et al (2003) reported higher prevalence rates of anxiety disorder and depression among children and adolescents with complex partial seizures compared to those with childhood absence seizures. Thome-Souza et al (2004) reported higher prevalence rates of psychopathology among patient with focal seizures compared to those with generalized seizure disorder. The information on the association with seizure frequency is inconclusive; Thome-Souza et al (2004) and Caplan et al (2005) found no association between seizure frequency and anxiety and depression. However, Austin et al (2002) found recurrent seizures to be a predictive factor for internalizing problems. A 7-year prospective study by Sbana et al (2002) however

found no difference in emotional problems between patients with on-going seizure and those in remission. Concerning age of onset of epilepsy, many studies do not report age of onset as a risk factor for depression (Thome-Souza et al., 2004, Austin et al., 2001, Dunn et al., 1999, Oguz et al., 2002) however Sabbagh et al (2006) suggested that there may be a relationship. Some studies have also found long duration of epilepsy as a risk factor for depression (Oguz et al., 2002, Austin et al., 2001).

2.6 Mental Health care for Children and Adolescents with Epilepsy

Although studies have shown high prevalence of psychopathology among children and adolescents with epilepsy, few studies have been done on the mental health care of these patients (Ott et al., 2003). Ott et al (2003) found in their study involving 114 children (5 to 16 years) with complex partial seizures and childhood absence seizure, approximately 60% had a psychiatric diagnosis and only 33% of them had received any form of mental health care. Ettinger et al (1998) in their study found that none of the children with epilepsy identified to have anxiety or depression had been previously identified or treated for their symptoms. Dunn et al (1999) also reported inadequate mental health care among children and adolescents with epilepsy and suggested that misinterpretation of psychiatric symptoms as manifestations of seizures or medication side effects may account for the failure to recognize psychiatric symptoms in these patients (Dunn & Austin,1999). There is therefore the need for more literature on mental health services for children with epilepsy and it is important for clinicians involved in the care of children and adolescents with epilepsy to do proper psychiatric evaluation and offer appropriate management.

Word count: 5,156

CHAPTER THREE

METHODOLOGY

3.1 Study Location

The study was carried out in Accra, Ghana. Ghana was known as the Gold Coast until the country gained independence in 1957(Ghana Districts, 2006). It is located in West Africa and is bordered by Togo on the east, Burkina Faso on the north and north-west, Cote D'Ivoire on the west and the Gulf of Guinea on the south. Ghana is divided into 10 administrative regions with 275 districts. There are three regions located in north of Ghana; Upper East, Upper West and Northern regions, Brong Ahafo and Ashanti regions in the middle belt of the country, the Eastern, Western, Greater Accra and Central regions in the south. The Volta region is found on the eastern part of Ghana. Ghana has a tropical climate and has three ecological zones; a northern savannah zone, middle and western forest zones and southern coastal plains (GDHS, 2008). The economy is mainly driven by agriculture which is responsible for about 34% of the gross domestic product (GDHS, 2008). Accra is the capital city of Ghana and also the capital city of the Greater Accra Region. The Greater Accra Region has a population of 4,010,154; about 17% of the total population of Ghana (24,658,832) according to the 2010 population and housing census. (Ghana Statistical Service, 2012) The Greater Accra region is further divided into the Accra and Tema metropolitan areas, as well as 13 other municipal areas (Ghana Districts, 2006). All the study sites are in the Accra metropolitan area which has a population of 1,848,614.

It was a hospital-based study and 4 study sites were used; two psychiatric hospitals (Accra Psychiatric Hospital and Pantang Psychiatric Hospital) and two general hospitals (Korle bu

Teaching Hospital, and the Princess Marie Louise Children's Hospital). These sites were used because they are the main public facilities in Accra where persons with epilepsy are treated.

The Korle-Bu Teaching Hospital (KBTH) was established in 1923 as a general hospital to meet health needs of the people of the Gold Coast which was pre-colonial Ghana (KBTH, 2015). It was upgraded to a teaching hospital in 1962 when the University of Ghana Medical School was established (KBTH, 2015). It is the main referral hospital in the southern part of Ghana. It has ten departments providing service in the major branches of medicine including radiotherapy and physiotherapy. It is also home to a Cardio-thoracic Centre which receives referrals from all over the West African sub-region and it provides tertiary level service to patients from all over the country. Patients with epilepsy are seen at an adult clinic (above 12 years) which is run by the neurology unit of the Department of Medicine and at the paediatric neurology clinic of the Department of Child Health years (Children 12 and below). Both clinics run on Mondays and data for this study was collected from both clinics. The Accra Psychiatric Hospital was initially established as a 'lunatic asylum' in 1888. In 1904 it was converted to a 200-bed psychiatric hospital which provides inpatients and outpatient services. The hospital does not have a specific clinic for patients with epilepsy. They are seen at the general out-patient clinics Mondays to Thursdays. It is one of the three psychiatric hospitals in Ghana. The Pantang Psychiatric Hospital was commissioned in 1975. It provides inpatient and outpatient services and persons with epilepsy are seen every Wednesday. The Pantang Hospital also has a drug rehabilitation centre. The hospital provides mental health care for patients from the Greater Accra Region of Ghana and from other parts of southern Ghana. The Princess Marie Louise (PML) Children's Hospital was commissioned in 1926 to provide health care to children with the aim of reducing child mortality. It currently runs out-patient and in-patient services as well as some specialist clinics

(Asthma, sickle cell and neuro-developmental). The hospital also has laboratory, dental facilities and a nutritional rehabilitation centre. It is situated in the central business centre of the city of Accra. The PML Children's hospital provides health care to children from all over Accra, with a majority of the patients living in the indigenous low-income communities close to the hospital. Children with epilepsy are seen at the neuro-developmental clinic which runs weekly on Fridays.

3.2 Study Design

A cross-sectional study design was used.

3.3 Sample Size

The sample size was calculated based on the prevalence of anxiety and depression among adolescents with epilepsy which is the primary outcome variable

The formula $n = Z_{\alpha}{}^{2}\, pq/d^{2}$ was used to calculate the sample size

Where:

n is the estimated sample size

d is the level of error which is 5% (0.05)

p is the prevalence of rate of anxiety and depression among adolescents found in literature. Lagunju et al (2012) found that 11.9% of Nigerian children and adolescents with epilepsy had emotional problems. Anxiety and depression are considered as emotional disorders hence p for this study will be 11.9% (0.119)

q = 1-p = 0.881

z= 1.96 at 95% confidence level

Then n = 1.96^2 x 0.119x 0.881/0.05^2

= 161 Adolescents need to be recruited for final analysis

Adjusting for non-response, with an estimated rate of

5% n= (100x161)/ (100-5)

= 169

Although the calculated sample size was 170, only 61 patients were recruited. This was because data collection was done over a period of 3 months and a number of adolescents with epilepsy were excluded due to the presence of intellectual disability because the study instruments were self-administered.

The formula $n = \frac{(Z\alpha + Z\beta)^2 pq}{d^2}$

The power of the study Z_β was calculated.

n is the sample size= 61

p is prevalence of anxiety = 57.4% (0.574)

q = 1-p = 0.426

d= 0.05

$Z\alpha$ = 1.96

Z_β = 1.17

p at Z_β of 1.17 is 0.879

Hence the power of the study is 87.9% which is adequate.

3.4 Study Population

The study was conducted among adolescents aged 10 to 19 years with epilepsy attending the 4 hospitals.

3.4.1 Inclusion criteria

1. Age range between 10 to 19 years
2. Clinical diagnosis of epilepsy plus or minus Electroencephalogram (EEG)
3. The adolescents receiving care as an out-patient in one of the 4 study sites
4. Informed consent and assent given by parent/caregiver and adolescent respectively.
5. At least 5 years of formal education

3.4.2 Exclusion Criteria

Less than 5 years of formal education

non-Consent or assent

3.5 Sampling Technique

Total enumeration of adolescents with epilepsy who met the inclusion criteria and gave consent/assent was done and participants were recruited consecutively.

3.6 Study Procedure

Patients presenting with epilepsy to the outpatient clinics of the 4 study sites were screened for inclusion into the study. Informed consent and assent was obtained and instruments were

administered by 5 trained research assistants (medical doctors), in addition to the researcher. Some clinical information was obtained from patients' folders. The research assistants were given minimal training because they were medical doctors who had worked in psychiatry unit for at least 6 months and the study instruments were largely self-administered. They were trained on how screen of inclusion, obtain informed consent and assent, guide patients to complete the instruments and to complete the section of the questionnaire that required information from patients' folders. Patients found to have any psychiatric conditions during the study were referred for treatment at the department of psychiatry, Korle bu Teaching Hospital, the Accra Psychiatric Hospital and Pantang Hospital. The instruments that were used for data collection are described below.

3.7 Data Collection Instruments

All instruments were administered in English as the target population was school age adolescents. The socio-demographic questionnaire was pretested at a polyclinic in Accra with a psychiatric unit which is manned by community psychiatric nurses. The Beck's Depression and Anxiety Inventories were pretested at a public primary school in Accra. Modifications were made to the instruments to clarify some of the items after pretesting. Modifications were made to 7 items on the Beck's Anxiety Inventory as follows:

1. Item 3: 'wobbliness in legs' was changed to 'weakness in legs'
2. Item 7: 'heart pounding' was changed to 'heart beating fast'
3. Item 10: 'nervous' was changed to 'worried or tense'
4. Item 17: 'scared' was changed to 'fearful or frightened
5. Item 18: 'Indigestion' was changed to 'Discomfort in the stomach or indigestion'
6. Item 20: 'face flushed' to 'feeling hot in the face'

7. Item 21: ‘Hot or cold sweats’ to “sweats not due to heat”

The following modifications were made to the Beck’s Depression inventory:

1. Item 19 concerning weight, ‘pounds’ was changed to ‘kilos’
2. Item 21 ‘interest in sex’ was changed to ‘interest in the opposite sex’

3.7.1 Questionnaire for socio-demographic characteristics and seizure variables

This is a 47 item instrument with three sections. The first section was adapted from the school health questionnaire developed by Omigbodun et al (2008). The other two sections were designed by the researcher. The questionnaire was used to collect information on demographic characteristics of the study subjects as well as seizure variables and information on mental health care. It had three sections: Section A was for collection of socio- demographic information and it had 25 items, Section B is for collection of information on seizure variables and it had 17 items and Section C is for information on past and present psychiatric treatment. It had 5 items. Section A was self-administered; Sections B and C were completed by the researcher or the research assistant who administered the questionnaire. (Appendix A)

3.7.2 Beck’s Depression Inventory and Beck’s Anxiety Inventory

The Beck’s Depression Inventory and Beck’s Anxiety Inventory were both developed by Aaron T. Beck and colleagues (Beck et al., 1961). The Beck’s Depression Inventory is a 21-item self-report inventory for measuring symptoms of depression; the presence and severity over the last 2 weeks (Beck et al., 1961). It requires 5^{th} to 6^{th} grade reading level to understand (Groth et al., 1990) which is equivalent to 5 to 6 years of formal education and it takes approximately 10

minutes to complete. The Beck's Anxiety Inventory is also a 21-item measure of anxiety symptoms over the last one month. It takes about 5 to 10 minutes to complete. Both instruments are screening tools and can be used in adults and adolescents (Jolly et al., 1993, Kashani et al., 1990). They have not been validated in Ghana however clinical data has been collected and the cutoffs found to be the same as that of the developed world. This data is unpublished. They are both used in Ghana for clinical practice and for research (Appendix A).

3.8 Ethical Considerations

Ethical Approval for the study was obtained from The Ghana Health Service Ethics Review Committee, Accra Ghana. Written Informed consent was obtained from parents or guardians by signature or thumbprint and assent to participate in the study was obtained from the adolescents. All information obtained was kept strictly confidential. Patients found to have anxiety or depression or any other psychiatric disorder during the course of the study were referred for treatment at the Accra Psychiatric Hospital, Pantang Psychiatric Hospital and Department of Psychiatry Korle Bu Teaching Hospital. The time for administration of the study instruments to each participant was about 15 to 30 minutes. This was done during the clinic visit hence no incentives were given to participants; however, they were move ahead in the queues at the clinics to minimize discomfort. Transportation costs and snacks were provided for a few participants who were required to return for further information to be obtained.

3.9 Data Management

Data was analyzed using the Statistical Package for Social Sciences (SPSS) software version 16. Demographic data and data on seizure variables were summarized using tables. The primary outcome measure is the prevalence of anxiety and depression and this was determined by calculating the proportion of adolescents with epilepsy who met the criteria for the above disorders using Beck's Inventories. The frequency distribution of anxiety or depression between selected demographic characteristics (age and sex) and seizure variables (type of seizure, age at onset of epilepsy, duration of epilepsy, seizure frequency, type of therapy- mono/poly therapy) was determined. The Fisher's exact test was used to determine the association between anxiety and depression and selected demographic variables and seizure variables. The Fisher-Freeman-Halton test was used when the categories of the independent variable was more than two (contingency tables greater than 2x2). Multivariate analyses were not done because bivariate analysis did not find significant associations.

The proportion of the adolescents with diagnoses of anxiety and depression who were receiving any form of psychiatric intervention was also determined.

Word count: 2,083

CHAPTER FOUR

RESULTS

This section presents the results of the study in accordance with the stated objectives and research questions. Section 4.1 presents the demographic characteristics of the participants, Section 4.2 gives the seizure variables of the participants, Section 4.3 presents the prevalence of anxiety and depression, section 4.4 presents the association between anxiety and depression and selected demographic characteristics and seizure variables; and section 4.5 shows on information on past and present mental health care received by participants.

4.1 Demographic characteristics of study participants

A total of 61 participants were recruited into the study. There were 31 males (50.8%) and 30 females (49.2%) Their ages ranged from 10 years to 19 years with a mean age of 15.52 ± SD 2.38 years. The ages of the participants were categorized into 10 to 14 years (early) and 15 to 19 years (late adolescence) using the demographic age groupings; twenty-eight (45.9%) were in the 10 to 14 years category and 33 (55.1%) in the 15 to 19 years category.

Among the study participants; fifty (82%) were from ethnic groups in middle, southern and eastern parts of Ghana (Akan, Ga and Ewe respectively). One was from the biggest ethnic group in northern Ghana. Out of the remaining 10 participants (16.4%), 2 were foreigners (Togo and Benin). Eight were from various ethnic groups in northern Ghana. Fifty-three (86.9%) were Christians and the remaining were Muslim. (Table 1a)

Out of the 61 study participants, fifty-one (83.6%) were enrolled in school. Among those who were not in school, 4(40%) had dropped out because they were missing school frequently due to seizures, 3(30%) had dropped out due to poor academic performance, 1 had dropped out because she got pregnant and 2(20%) did not give a reason for dropping out. Almost half of the participants; twenty-six (46.4%) reported they were currently having difficulties in school. The difficulties included problems understanding some specific subjects, and not remembering what was taught in class.

Table 4.1a Age, sex, ethnicity, religion and educational background of study participants

N= 61

Demographic Characteristics	Frequency (n)	Percent (%)
Age group (years)		
10 to 14	28	45.9
15 to 19	33	55.1
Gender		
Male	31	50.8
Female	30	49.2
Ethnicity		
Akan	29	47.5
Ga/Dangbe	14	23.0
Ewe	7	11.5
Mole-Dagbani	1	1.6
Others[1]	10	16.4
Religion		
Christianity	53	86.9
Islam	8	13.1

[1]Includes 2 foreigners (Togo and Benin) and 8 from various ethnic group in the northern part of Ghana

[2] One was living in an orphanage, one in a prayer camp and 1 with an uncle

[3] One had focal seizure; one had mixed absence and generalized tonic clonic type. 4 did not have clearly identified

(Table 4.1a continued)

Table 4.1a Age, sex, ethnicity, religion and educational background of study participants

N= 61

Demographic Characteristics	Frequency (n)	Percent (%)
Currently in School		
Yes	51	83.6
No	10	16.4
Ever repeated a class		
Yes	21	34.4
No	40	65.6
School difficulties		
Yes	26	46.4
No	30	53.6

Table 4.1b Family characteristics study of participants N= 61

Family Characteristics	Frequency (n)	Percent (%)
Family Type		
Monogamous	50	84.7
Polygamous	9	15.3
Marital status of parents		
Not married	10	16.4
Married	45	73.8
Separated/Divorced	6	9.8
Who patient lives with		
Both parents	34	55.7
Mother	14	23.0
Father	2	3.3
Grandparent(s)	8	13.1
Others[2]	3	4.9

[2] One was living in an orphanage, one in a prayer camp and 1 with an uncle

4.2 Seizure variables of Study Participants

Electroencephalogram (EEG) had been done by 45 participants (73.8%). The predominant seizure type was the generalized tonic clonic type as reported in 41 participants (68.3%). Other seizure types found include mixed seizure absence and generalized tonic clonic (1 participant) and focal seizures (1 participant). The seizure types for 4 participants were not clearly stated in their clinical notes. The age at onset of seizures was one year or below for 5 (8.3%) of the participants and 37 (61.7%) had onset of seizures after 10years of age.

The most common Anti-epileptic drug (AED) used by respondents was Carbamazepine as reported by 27 participants (45.8%). Ten participants were on different combination of AEDs (Carbamazepine, sodium valproate, topiramate, phenobarbitone and levetiracetam), one participant was on four medications which included lamotrigine and clonazapam (See Table 4.2). Majority of the study participants; 49 (83.1%) were being treated by only one AED (monotherapy) and two participants were not on any AED at the time of the study; one had not commenced treatment and one had been seizure free for 2 years hence the medication had been tailed off (See Table 4.2).

The seizure variables of the participants have been summarized in Table 4.2

Table 4.2 Distributions for seizure variables of study participants N=61

Seizure variables	Frequency (n)	Percent (%)
EEG done		
Yes	45	73.8
No	16	26.2
Type of epilepsy		
Generalized tonic clonic	41	68.3
Complex Partial Seizures	7	11.7
Absence Seizures	6	10.0
Others[3]	6	10.0
Age at onset of seizures(years)		
1year or less	5	8.3
2-5	5	8.3
6-9	13	21.7
10 or more	37	61.7
Seizure frequency(in a month)		
No Seizure	32	52.5
1 or more	29	47.5

[3] One had focal seizure; one had mixed absence and generalized tonic clonic type. 4 did not have clearly identified seizure types recorded in their clinical notes.

(Table 2 Continued)

Table 4.2 Distributions for seizure variables of study participants N=61

Seizure variables	Frequency (n)	Percent (%)
Duration of Epilepsy (years)		
1-4	23	39.0
5-9	20	33.9
10 or more	16	27.1
Type of therapy		
No Medication	2	3.3
Monotherapy	49	80.3
Polytherapy	10	16.4
AED used		
No Medication	2	3.3
Carbamazepine	27	44.3
Sodium Valproate	11	18.0
Topiramate	1	1.6
Levetiracetam	6	9.8
Phenobarbitone	4	6.6
Others[4]	10	16.4

[4] Various combination of AEDs (Carbamazepine, sodium valproate, topiramate, phenobarbitone and levetiracetam), one participant was on four medications which included lamotrigine and clonazapam

4.3 Prevalence of Anxiety and Depression

About one third of the participants, 18 (30.5%) met the cut off for depression (BDI scores of 17 and above), 35 participants (57.4%) met the cut off for anxiety (BAI scores of 10 and above) and 15(25.4%) participants met the criteria for both disorders.

Among those who met cut off for depression, 5 (29.4%) participants had scores in the mild depression range (BDI scores of 17-20), 10 (58.8%) had scores in the moderate depression range (BDI scores of 21-30), and 2 (11.8%) had scores in had severe depression range (BDI scores of above 30). (See figure 4.1)

Among those with anxiety; 17(44.7%) had scores in the mild anxiety range (BAI scores of 10-18), 13(34.2%) had scores in the moderate anxiety range (BAI scores of 19-29), and 8(21.1%) had scores in the severe anxiety range (BAI scores of 30-63). (See figure 4.1)

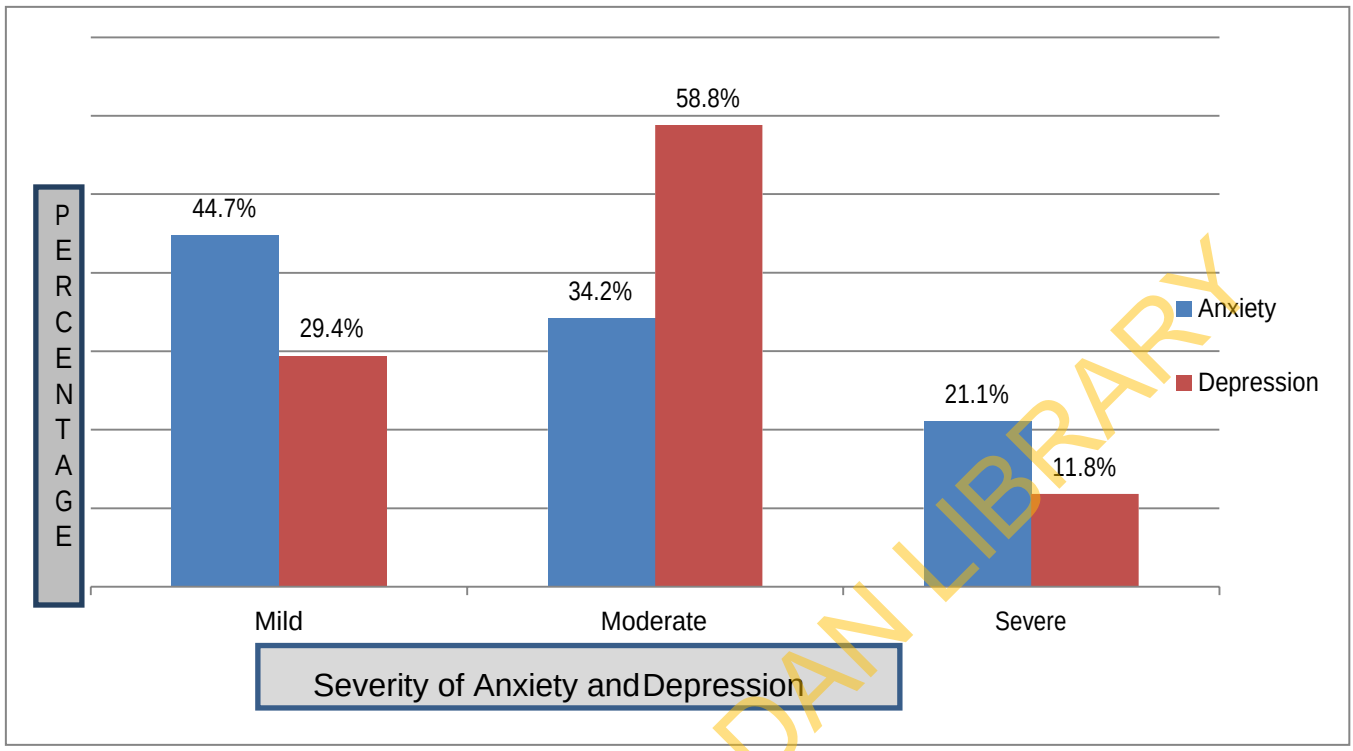

Figure 4.1 Distributions for severity of anxiety disorders and depression

4.4 Association between anxiety and depression and socio-demographic factors and seizure variables

Depression and anxiety were found to be more prevalent among females than males; 37% of females screened positive for depression compared to 23% of males and 67% of females screened positive for anxiety compared to 48% of males. There was however no statistically significant association between sex and anxiety or depression. The study also found no significant association between age and anxiety or depression. The prevalence of anxiety was however higher among younger adolescents (64%) compared to older adolescents (52%). whereas the prevalence depression was higher among older adolescents (33%) compared to younger adolescents (27%). Tables 4.3 and 4.4 summarize the association between selected demographic characteristics and anxiety and depression.

Table 4.3 Association between anxiety and selected demographic characteristics of study participants

Demographic Characteristics	Anxiety N (%)		P value
	Yes	No	
Age group(years)			
10 to 14 (n= 28)	18(64)	10(36)	0.228
15 to 19 (n= 33)	17(56)	16(48)	
Sex			
Male (n= 31)	15(48)	16(52)	0.118
Female (n= 30)	20(67)	10(33)	
Religion			
Christianity (n= 53)	31(58)	22(42)	0.467
Islam (n= 8)	4(50)	4(50)	

Table 4.4 Association between depression and selected demographic characteristics of study participants

Demographic Characteristics	Depression N (%)		P value
	Yes	No	
Age group(years)			0.405
10 to 14 (n= 26)	7(27)	19(73)	
15 to 19 (n= 33)	11(33)	22(67)	
Sex			0.134
Male (n= 31)	7(23)	24(77)	
Female (n= 30)	11(37)	19(63)	
Religion			0.226
Christianity (n= 53)	17(32)	36(68)	
Islam (n= 8)	1(13)	7(87)	

Among the seizure types, the prevalence of depression and anxiety were highest among patients with complex partial seizures; 71% and 43% respectively. However, there was no statistically significant association between seizure type and depression or anxiety. There was also no significant association between age of onset of seizures and anxiety or depression. The prevalence of depression was higher among patients who were had one or more seizures in a month (37%) compared to those who had no seizure in a month (25%). The difference observed was however not statistically significant. There was also no significant association between type of therapy and depression or anxiety. However, on polytherapy were found to have a higher prevalence of anxiety (70%) than those on monotherapy (53%). Tables 5 and 6 summarize the association between seizure variables and anxiety and depression.

4.5 Association between anxiety and seizure variables of participants

Seizure Variables	Anxiety N (%)		P value
	Yes	No	
Seizure type			0 .881
Generalized tonic clonic (n=39)	23(56)	18(44)	
Complex partial (n=7)	5(71)	2(29)	
Absence (n=6)	3(50)	3(50)	
Others (n=6)	3(50)	3(50)	
Age at onset (years)			0.433
1 year or less (n=5)	1(20)	4(80)	
2 to 5 (n=5)	3(60)	2(40)	
6 to 9 (n=13)	8(62)	5(38)	
10 and above (n=37)	22(60)	16(40)	
Duration of Epilepsy (years)			0.946
1 to 4 (n=23)	14(61)	9(39)	
5 to 9 (n=20)	11(55)	9(45)	
10 or more (n=16)	9(56)	7(44)	
Seizure frequency			0.202
No seizure (n=32)	21(66)	12(33)	
1 or more (n=29)	14(48)	15(52)	
Type of therapy			0.484
Monotherapy (n=49)	26(53)	23(47)	
Polytherapy (n=10)	7(70)	3(30)	

4.6 Association between depression and seizure variables of participants

Seizure Variables	Depression N (%)		P value
	Yes	No	
Seizure type			0.833
Generalized tonic clonic (n=41)	12(31)	27(69)	
Complex partial (n=7)	3(43)	4(57)	
Absence (n=6)	2(33)	4(67)	
Others (n=6)	1(17)	5(83)	
Age at onset (years)			0.406
1 year or less (n=5)	0	6(100)	
2 to 5 (n=5)	2(40)	3(60)	
6 to 9 (n=12)	5(42)	7(58)	
10 or more (n=36)	11(31)	25(69)	
Duration of Epilepsy (years)			0.271
1 to 4 (n=23)	6(26)	17(74)	
5 to 10 (n=18)	8(42)	10(58)	
More than 10 (n=16)	3(19)	13(81)	
Seizure frequency			0.399
No seizure (n=32)	8(25)	24(75)	
1 or more (n=27)	10(37)	17(63)	
Type of therapy			0.458
Monotherapy (n=49)	15(31)	34(69)	
Polytherapy (n=10)	2(22)	8(78)	

4.5 Previous Diagnosis and Treatment of Anxiety or Depression

Only 1 out of the 61 participants had been previously diagnosed and treated for anxiety disorder/depression. None of the respondents was on treatment for anxiety or depression at the time of data collection.

Word count: 1,012

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion

Epilepsy is a common chronic neurological condition among adolescents (MacLeod & Austin 2003, Paolicchi, 2002). This is especially so in developing countries because of the presence of risk factors such as infections and trauma (Preux & Dreux-Cabanac, 2005). In developing countries, the peak prevalence of epilepsy is during the second decade of life (Preux & Dreux-Cabanac, 2005), which is the period of adolescence. The prevalence of anxiety and depression among 61 adolescents with epilepsy in Accra Ghana, and their associations with some demographic characteristics and seizure variables are discussed in relation to studies from other parts of the world.

More than half of the study participants were 15 to 19 years old (55.1%) and the male female ratio was almost 1:1. Studies have shown that epilepsy is more prevalent in males than females however the differences have often not been statistically significant (Roman & Senanayake 1993). The prevalence also increases with age with peak prevalence during the third and fourth decades of life (Roman & Senanayake 1993), however studies from some parts of Africa found peak prevalence in the second decade of life (Roman & Senanayake 1993). More than 80% of the respondents were from the middle, eastern and southern parts of Ghana and majority were affiliated with Christianity (86.9%). Accra is a metropolitan area and home to people from various parts of the country. Akan is the largest ethnic group in Ghana making up about 47% of

the population of Ghana and Christianity is the religious affiliation of majority of Ghanaians (Ghana Statistical Service, 2012).

Majority of the respondents came from monogamous families (84.7%) and majority also had married parents (74%). Over 50% of men and almost 60% of women aged 15 to 49 years in Ghana are in a union (formally married or living together) and 87% of women who live in urban areas of Ghana are in monogamous marriages (Ghana Statistical Service, 2009). The percentage of married parents in this study was higher than the national figures; this may be because this study was done in an urban population hence not representative of the situation in the whole country.

Majority of the participants in this study (68.3%) had a diagnosis of generalized tonic clonic seizure type. Findings in literature from other parts of the world (Preux & Dreux-Cabanac, 2005) report generalized tonic clonic seizure as the most prevalent seizure type. An earlier paper from Ghana also reported generalized tonic clonic seizure as the most common seizure type making up 76.5% of children with epilepsy who were seen over a ten-year period at the Korle-bu Teaching Hospital paediatric out-patients department, Accra, Ghana (Commey, 1994). A review of some literature from the developing world (Africa, Asia and Latin America), including 6 studies from Africa however reported partial seizures as being the most common type of seizures (Roman & Senanayake, 1993). The age at onset of seizures for more half of the participants in this study was age 10years and above. This finding is inconsistent with epidemiology of epilepsy in children. The incidence of epilepsy is known to be highest in the first year of life and then declines through childhood to adolescence (Cowan, 2002). This inconsistency may be due to the small sample size and also because a large number of patients with epilepsy with co-morbid moderate to severe intellectual disability were excluded due to the self-report instruments used.

The Antiepileptic Drug (AED) used by majority of the respondents was carbamazepine (43.3%) and 80.3% were on only one medication (monotherapy). This is similar to findings from some other African countries (Mbewe et al., 2013, Lagunju et al., 2008, Adewuya and Ola, 2004). Carbamazepine is one of the AEDs found to be most available in developing countries a significant number of participants were also on newer drugs such as levetiracetam (Cameron et al., 2011, Mac et al., 2006), however. This may be because the study was carried out in an urban area and all the facilities offer tertiary level care.

The prevalence of anxiety among adolescents with epilepsy in this study was 57.4%, the prevalence of depression was 30.5% and 25.4% met the criteria for both conditions. In a review of literature, Ekinci et al (2008) found prevalence rates of anxiety ranging between 15% to 20% and the prevalence of depression to be between 23% to 26 % in studies that used self-report instruments among children and adolescents with epilepsy. Ekinci et al (2008) reviewed studies in predominantly developed countries and studies with both children and adolescents. Plioplys et al (2007) also did a review of literature published over a 10-year period (1997 to 2007) covering psychopathology among children with epilepsy and found prevalence rates of anxiety and depression to be from 16% to 31% in community based or university affiliated studies. Higher rates were however found in clinical settings (Plioplys et al., 2007). Adewuya and Ola (2004) in their study involving Nigerian adolescents (12 to 18 years) with epilepsy found prevalence rates of 31.37% for depression and 28.43% for anxiety. In their study Adewuya and Ola (2004) used the Diagnostic Interview Schedule for children version IV (DISC IV) which is a diagnostic instrument based on the DSM IV criteria in assessment of the psychiatric disorders and this study used Beck Anxiety and Depression scales which are self-report screening instruments. This may be the reason for the differences in prevalence rates between their study and this study although

both studies were carried out among adolescents with similar socio-demographic backgrounds. Another factor that may be responsible for differences in prevalence rates is the difference in sample sizes between the Nigerian study and this study. Alwash et al (2000) compared 101 Jordanian adolescents and young adults (14 to 24 years) to 101 non epileptic controls and found prevalence rates of anxiety and depression of 48.5% and 22.8% respectively compared to 16.8% and 10.9% in the control group. The findings in the Jordanian study is closer to the prevalence rates found in this study although in the Jordanian study diagnostic interviews based on the DSM IV classification was used for the diagnosis of the psychiatric disorders. A few studies from the developed world have also reported high prevalence rates. Caplan et al (2005) found 63% of children and adolescents (5 to 16 years) with epilepsy had anxiety and 19% had depression. Caplan et al (2005) used the children depression inventory and the multidimensional anxiety scale which are both self-report screening scales for assessment of depression and anxiety respectively.

In general, socio-demographic such as age and sex have not been consistently associated with an increased risk depression among adolescents with epilepsy as reported Adewuya and Ola (2004) in Nigeria and Alwash et al (2000) in Jordan and also from the developed world (Ettinger et al., 1998). This study found no significant association between sex and depression however the prevalence of depression was higher among females compared to males (37% to 23% respectively). This may be due to the fact that in general depression is more prevalent in adolescent females (Bhatia & Bhatia 2007, Birmaher et al., 1998). Studies among children and adolescents with epilepsy have varying findings; Bilgic et al (2007) found that depressive symptoms were more prevalent among boys in their study among Turkish children and adolescents (8 to 16years), Martinovic et al (2007) found depressive symptoms more in

adolescent girls and Ettinger et al (1998) found no association between gender and the presence depressive symptoms. Symptoms of depression were more prevalent among older adolescents (15 to 19 years); this finding was also not statistically significant. Oguz et al (2002) also found significantly higher scores of depressive symptoms using the Child depression Inventory (CDI) among the 12 to 18 age group compared to the 9 to 11 age group. In general, the prevalence of depression among adolescents is found to increase with age (Saluja et al; 2004). This may account for the increased prevalence with age seen among adolescents with epilepsy.

The study did not find a significant association between seizure type and depression. However, the prevalence of depressive symptoms was highest among participants with a diagnosis of complex partial seizures (43%) as compared to generalized tonic clonic seizures and absence seizures. It has been suggested by other authors that seizure involvement in certain cerebral regions may be responsible (Caplan et al., 2005). Thome-Souza et al (2004) reported that focal seizures in general are more often associated with psychopathology than generalized seizures. Seizure frequency has been found to be an important risk factor for depression among children and adolescent with epilepsy (Adewuya and Ola, 2004, Austin et al., 2002). This study found no significant association between seizure type and depression although a higher prevalence of depression was found among participants with ongoing seizures. This may be due to the presence of other psychosocial issues associated with recurrent seizure such as stigma and lack of education or employment (Alwash et al., 2000). Age of onset and duration of epilepsy have also been found in some studies to be associated with an increased risk depression (Sabbagh et al., 2006, Oguz et al., 2002). This study however did not find a significant association between age of onset of seizure or duration of epilepsy and depression. The prevalence of depressive symptoms was also found to be higher among adolescents on one AED (monotherapy) compared

to those on more than one AED. This finding was not statistically significant. Adewuya and Ola (2004) however reported that there was significant association between number of antiepileptic drugs (poly-therapy) and depression. AEDs have been reported to have mostly cognitive side effects and some have mood stabilizing effects (Bourgeois 1998). Hence the association between number of AEDs and depression may have to be studied further.

In the general population of children and adolescents anxiety disorders are more prevalent among females although some studies from western countries have reported equal or even higher prevalence among males (Rapee, 2012). However, among adolescents with epilepsy, most studies have shown no significant association between gender and anxiety (Ekinci et al; 2009). Different types of anxiety disorders are found more in particular age groups (Rapee, 2012). Generalized anxiety disorder for which the study instrument used in this study screens for often begins in early adolescents (Rapee, 2012). This study found a higher prevalence of anxiety among younger adolescents and also a higher prevalence was found among females. These findings were not statistically significant. Among children and adolescents with epilepsy, Caplan et al (2005) found anxiety symptoms were more common among children of younger ages. Oguz et al (2002) however found higher anxiety scores among older ages (12 to 18 years) as compared to 9 to 11 age group. Other studies found no association between age and anxiety (Adewuya and Ola, 2004, Baki et al; 2004). Participants with complex partial seizure type were also found to have a higher prevalence of anxiety as reported with depression. Caplan et al (2005) found anxiety to be more prevalent among children and adolescents with Childhood absence seizures compared to those with complex partial seizures. The reason for this observation is however unknown. Participants on Polytherapy were also found to have a higher prevalence (70%) of anxiety than those on monotherapy (53%). This observation was also reported by Adewuya and

Ola (2004) in a similar study among Nigerian adolescents. Increased seizure frequency has also been reported in literature to be significantly associated with anxiety (Adewuya and Ola 2004, Oguz et al; 2002 and Alwash et al; 2000). Although not statistically significant, this study found a higher prevalence among participants with controlled epilepsy (no seizures in 1 month) compared to those who had 1 or more seizures. The reason for this was not clear from the study.

This study also reviewed patients' previous hospital records to determine if any of the adolescents had previous or current diagnosis of anxiety disorder or depression or was being treated for any of the two conditions. The aim was also to compare diagnosis and treatment of anxiety and depression between neurology and psychiatric facilities. Only one out of the 61 respondents had a previous diagnosis of anxiety/depression and that patient was receiving care at a neurology clinic. This shows that there was inadequate mental health care for the adolescents with epilepsy which has been reported in studies from other parts of the world. Ott et al (2003) found that although 60% of children aged 5 to 16 years had a psychiatric diagnosis, only 33% of them received any form of mental health care. Ettinger et al (1998) found that although 26% of children (7 to 18years) with epilepsy in paediatric neurology clinic scored significantly high on a depression scale and 16% on an anxiety scale, none was re receiving any form of mental health care. Mbewe et al (2010) reviewed 200 clinical notes of adult epilepsy patients receiving care in a primary level facility in Zambia and found 21% of the folders had records of anxiety symptoms and 10.5% had symptoms of depression. Only 1% had clear diagnosis of depression, none had diagnosis of anxiety and 4% had antidepressants prescribed with no diagnosis. These show clearly the inadequacy of mental health care for patients with epilepsy. It has been suggested by some authors that may be due to psychiatric symptoms being misinterpreted as medication side effects or manifestations of seizures (Dunn & Austin 1999). There is a need for further studies in

developing world especially to determine reasons why psychopathology is not given the needed attention by health professionals.

5.2 Conclusion

This study shows that there in anxiety and depressive symptoms are prevalent among adolescents with epilepsy. The study did not find significant association between socio-demographic and anxiety and depression. The study found that although anxiety and depression are common among adolescents with epilepsy they are unrecognized and untreated as seen in other parts of the world. Further studies will be on the other mental health and behavior problems among children and adolescents with epilepsy in Ghana.

5.3 Recommendations

It is also recommended that health professionals caring for children and adolescents with epilepsy and other chronic conditions consciously look out for symptoms of mental illness. This can be done using short screening tools as used in this study.

5.4 Limitations

The main limitation of this study was the small sample size and hence the findings may not be applicable to the general population of adolescents with epilepsy in Ghana. The small sample size was due to short period of time for data collection (three months). Another factor was the exclusion of patients who had co-morbid moderate to severe intellectual disability because it was anticipated that they will not be able to understand and complete the study instruments.

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Appendix A Study Instruments

INFORMATION SHEET AND CONSENT FORM (Parents/Caregivers)

Title of Study: Depression and Anxiety Disorders Among Adolescents with Epilepsy in Accra, Ghana: Prevalence and Correlates.

My name is Dr Selasie Addom; I am a medical doctor (resident) at Department of Psychiatry, Korle Bu Teaching Hospital and also a Master of Science student at the University of Ibadan, Nigeria. Telephone number: 0202536026, Email address: saddom@gmail.com

I am conducting a study on Depression and Anxiety Disorders among Adolescents with Epilepsy in Accra, Ghana: Prevalence and Correlates. This is part of the requirements for completion of my masters. My aim is to determine the percentage of adolescents with epilepsy who have depression and anxiety symptoms; which are common mental health conditions among epilepsy patients and determine the factors that are associated with having these conditions in adolescents in Ghana. I will be doing this by conducting interviews at the clinic.

Your child's involvement in this study includes providing some background information about himself or herself, family and home circumstances as well as answering some questions about his or her mood and feelings in the clinical interview. Some information will also be obtained from his/her folder. This is a one-time process which will take about 45minutes to an hour at during your clinic visit. He/she will not be given any form treatment as part of this study hence there minimal risks to your child but if your child is found to have depression or anxiety from the clinical interview he/she will be referred for appropriate management at the department of Psychiatry Korle bu Teaching Hospital or at the Accra Psychiatric Hospital. Your child's participation in this study will allow for detection and referral for treatment of anxiety disorder and depression as well as any other mental health condition found during the clinical interview. In the long term, findings from this study may be used for planning health services for adolescents with epilepsy in Ghana. There is no direct financial costs to you in participation in this study, however if your child is referred for mental health care you may be required to pay for your treatment.

All information provided by your child will be kept **strictly confidential** and is for the purpose of this research only. You and your child are free to decide not to participate in the study after reading the information provided above. You are also free to withdraw from the study even after you have started. The outcome of the clinical interview will be communicated to you after

the interview however if you wish to know the outcome of the study as well, it will also be communicated with you when the study is completed.

For further information about the study please contact Dr Selasie Addom on: Telephone number: O202536026 Email: saddom@gmail.com

Or

Hannah Frimpong,

Administrator, Ghana Health Service Ethics Review Committee Telephone (office): 0302 681109

Mobile: 0243235225 or 0507041223

Parental Consent

Ihavereadandunderstoodtheinformationprovidedaboutthisstudy,Igivemyconsentformy child to participate.

Signature…… Date……

Witness

Signature…… Date……..

Researcher

Signature…… Date……...

INFORMATION SHEET AND ASSENT FORM (Adolescents)

Title of Study: Depression and Anxiety Disorders Among Adolescents with Epilepsy in Accra, Ghana: Prevalence and Correlates.

My name is Dr Selasie Addom; I am a medical doctor (resident) at Department of Psychiatry, Korle Bu Teaching Hospital and also a Master of Science student at the University of Ibadan, Nigeria. Telephone number: 0202536026, Email address: saddom@gmail.com.

I am conducting a study on Depression and Anxiety Disorders among Adolescents with Epilepsy in Accra, Ghana: Prevalence and Correlates. This is part of the requirements for completion of my masters. My aim is to determine the percentage of adolescents with epilepsy who have depression and anxiety symptoms; which are common mental health conditions among epilepsy patients and to determine the factors that are associated with having these conditions in adolescents in Ghana. I will be doing this by conducting interviews at the clinic.

Your involvement in this study includes providing some background information about yourself, family and home circumstances as well as answering some questions about your mood and feelings in the clinical interview. This is a one-time process which will take about 45 minutes to an hour at during your clinic visit. Some clinical information will also be obtained from your folders. You will not be given any form treatment as part of this study hence there is minimal risks to you but if you are found to have depression or anxiety from the clinical interview you will be referred for appropriate management at the department of Psychiatry Korle bu Teaching Hospital or at the Accra Psychiatric Hospital. Your participation in this study will allow for detection and referral for treatment of anxiety disorder and depression as well as any other mental health condition found during the clinical interview. In the long term, findings from this study may be used for planning health services for adolescents with epilepsy in Ghana. There is no direct financial costs to you in participation in this study, however if you are referred for mental health care you may be required to pay for your treatment.

All information you provide will be kept **strictly confidential** and is for the purpose of this research only. You free to decide not to participate in the study after reading the information provided above. You are also free to withdraw from the study even after you have started. The outcome of the clinical interview will be communicated to you after the interview however if you wish to know the outcome of the study as well, it will also be communicated with you when the study is completed.

For further information about the study please contact Dr Selasie Addom on: Telephone number: O202536026 Email: saddom@gmail.com

And

Hannah Frimpong,

Administrator, Ghana Health Service Ethics Review Committee Telephone (office): 0302 681109

Mobile: 0243235225 or 0507041223

Assent

I have read and understood the information provided about this study, I assent to participate.

Signature..... Date……

Witness

Signature …….. Date ……..

Researcher

Signature …….. Date ……

Questionnaire

Questionnaire number…….. Date

of Administration……..

Hello, my name is Dr Selasie Addom, I am a medical doctor at the Korle-bu teaching Hospital/Accra Psychiatric hospital and a Masters student at the University of Ibadan, Nigeria.

I am conducting a study on Depression and Anxiety disorders among adolescents with Epilepsy. This purpose of the study is for my dissertation which is a requirement for completion of my masters program and also to provide data which can be used to plan mental health services for adolescents. Adolescents who are found to have depression or anxiety disorder will be referred for treatment.

Information provided in this questionnaire will be kept strictly confidential and there will be no way of identifying participants in the final write-up.

Thank you.

Section A- Socio-demographic Information:

Personal Information

1. Name or Initials: ……..

2. Age: *(years)* …….

3. Date of birth (day-month-year)……

4. Sex: *(please tick)* 1. Male ☐ 2. Female ☐

5. Ethnicity: *(please tick)* 1. Akan ☐ 2. Ga/Dangbe ☐

   3. Ewe ☐ 4. Mole-Dagbani ☐

   5. Others ☐ (please specify)……

6. Religion: 1. Christian ☐ 2. Muslim ☐ 3. Traditionalist ☐

   4. Others ☐ *(please specify)* ……..

7. Are you currently going to school? 1. Yes ☐ 2. No ☐

   If yes please proceed to question 10. If no please proceed to question 8.

8. At what level did you stop schooling? (*What was the last form/class you completed?)*

1. Class 5 ☐ 2. Class 6 ☐ 3. JHS 1 ☐ 4. JHS 2 ☐

5. JHS 3 ☐ 6. SHS 1 ☐ 7. SHS 2 ☐ 8. SHS3 ☐

9. Others ☐ *(please specify)* ……

9. Why did you stop schooling?

1. Financial reasons ☐

2. I am not doing well in school ☐

3. I miss school frequently because of the illness (epilepsy) ☐

4. I am teased or bullied at school because of the illness ☐

5. Others ☐ (please specify)……

10. Which class/form are you in now? 1. Class 5 ☐ 2. Class 6 ☐ 3. JHS 1 ☐

4. JHS 2 ☐ 5. JHS 3 ☐ 6. SHS 1 ☐

7. SHS 2 ☐ 8. SHS 3 ☐

9. Others ☐ *(please specify)* ……

11. Have you ever repeated any classes? 1. Yes ☐ 2. No ☐

12. If yes, how many classes have you repeated? 1. 1 class ☐ 2. 2 classes ☐

3. More than 2 classes ☐

13. Are you having any difficulties with your school work? 1. Yes ☐ 2. No ☐

If yes what problems……

Family Information

14. How many wives does your father have?

1. One wife ☐ 2. More than one wife ☐

15. Number of mother's children……

16. Number of Father's children……

17. What is your position among your father's children? .....

18. What is your position among your mother's children? .....

19. Marital Status of your parents: 1. Not married ☐ 2. Married ☐

3. Separated/divorced ☐

20. Who do you live with presently? 1. Both Parents ☐ 2. Mother ☐ 3. Father ☐

4. Brother/Sister ☐ 5. Grandparents ☐

6. Other ☐ *(please specify)*……

21. What is your father's level of Education? 1. No formal Educat ion ☐

2. Primary ☐ 3. Basic (Middle School/JSS/JHS) ☐

5. SSS/SHS/Technical/Vocational ☐

6. Tertiary ☐ 7. Post graduate ☐

8. Others ☐ please specify……..

22. What is your father's occupation? 1. No employment ☐

2. Student ☐ 3. Trader ☐ 4. Fisherman/Fishmonger ☐

5. Farmer ☐ 6. Artisan ☐ 5. Civil Servant/ Public Servant ☐

7. ☐ Professional (Teacher, nurse, lawyer etc)

8. Others ☐ please specify……

23. What is your mother's level of education? 1. No formal Education ☐

2. Primary ☐ 3. Basic (Middle School/JSS/JHS) ☐

5. SSS/SHS/Technical/Vocational ☐

6. Tertiary ☐ 7. Post graduate ☐

8. Others ☐ please specify…….

24. What is your mother's occupation? 1. No employment ☐

2. Student ☐ 3. Trader ☐ 4. Fisherman/Fishmonger ☐

5. Farmer ☐ 6. Artisan ☐ 5. Civil Servant/ Public Servant ☐

7. Professional (Teacher, nurse, lawyer etc) ☐

8. Others ☐ please specify……

25. Please indicate if your family (parents/caregiver) or household owns any of the following:

ITEMS	YES	NO
Radio		
Colour television		
Mobile phone		
Refrigerator		
Freezer		
Computer		
Washing machine		
Bicycle		
Motor bike		
Car or truck		

Section B- Seizure Characteristics *(information to be obtained from patient or caregiver as well as from patients' folders)*

26. Has EEG been done? 1. Yes ☐ 2. No ☐

27. Type of epilepsy: 1. Generalized tonic clonic ☐ 2. Complex Partial Seizure ☐

3. Absence seizure ☐ 4. Others ☐ *(please specify)*……

28. Age of onset of epilepsy ……

29. Age at Diagnosis of Epilepsy…….

30. Duration ofepilepsy……

31. Age at onset of Anti epileptic drugs ……..

32. Seizure frequency before onset of antiepileptic drugs (number of seizures in a week)

……..

33. Seizure frequency after onset of Anti epileptic drugs (number of seizures in a week)

……..

34. Longest seizure free period……

35. Please list Anti Epileptic medications being used currently I.

……

II. ……

III. ……

IV. ……

36. Changes in drug therapy: 1. Yes ☐ 2. No ☐

If No, please proceed to question 37.

37. Previous drugregime……..

38. Reasons for Changes in drug therapy: 1. Side Effects ☐ 2. Poor seizure control ☐

3. Others ☐ *please specify*……

39. Have you experience any side effects of your medication? 1. Yes ☐ 2. No ☐

If yes proceed to Que. 38, if no proceed to 39

40. Which side effects have you experienced? 1. Weight gain ☐ 2. Drowsiness ☐

3. Skin rash ☐ 4. Others ☐ please specify……..

41. Compliance: Do you take your medication everyday as prescribed by the doctor?

1. Yes ☐ 2. No ☐

42. How many doses of your medication have you missed in the last one week?

1. 1 dose ☐ 2. 2 doses ☐ 3. 3 doses ☐

4. 4 doses ☐ 5. 5 doses ☐ 6. More than 5 doses ☐

Section C- Diagnosis and treatment of depression or anxiety disorder

43. Are you currently taking any medication aside your epilepsy medication?

1. Yes ☐ 2. No ☐

44. If yes, please list the medications:

…… ……

…… ……

45. Is there record of a diagnosis of anxiety disorder or depression in the patient's folder?

1. Yes ☐ 2. No ☐

46. Has the patient ever been treated for anxiety disorder or depression? (from patient's folder) 1. Yes 2. No ☐ ☐

47. Is the patient currently being treated for anxiety disorder or depression? (from patient's folder)

1. Yes 2. ☐ No ☐

Beck's Anxiety Inventory

Below is a list of common symptoms of anxiety. Please read each item carefully. Indicate how much you were bothered by each symptom in the last one month including today, marking an **X** in the degree of disturbance in the column of cells on the right.

№	Symptoms	How much you were bothered			
		Not at all **0** **It did not bother at all**	Mild **1** **It bothered a little**	Moderate **2** **It bothered a lot but I could handle it**	Severe **3** **I could almost not stand it**
1	Numbness or tingling				
2	Feeling Hot				
3	Weakness in legs				
4	Not able to relax				
5	Fear of the worst happening				
6	Dizzy				
7	Heart beating fast or heart racing				
8	Restless				

9	Afraid or terrified				
10	Worried or tense				
11	Feeling of choking				
12	Shaky or trembling Hands				
13	Trembling				
14	Fear of losing control				
15	Difficulty in breathing				
16	Fear of dying				
17	Fearful or frightened				
18	Discomfort in the stomach or indigestion				
19	Faint or weak				
20	Feeling hot in the face				
21	Sweat (Not due to Heat)				
	Column totals:				

Total score……..

Score	Interpretation
10 - 18	Mild anxiety
19 - 29	Moderate anxiety
30 - 63	Severe anxiety

Beck's Depression Inventory

Please choose one statement from among the groups of statements that best describe how you have been feeling over the past 2 weeks including today. Indicate your choice by circling the number next to the statement.

1	0 I do not feel sad 1 I feel sad 2 I feel sad all the time and I can't snap out of it 3 I am so sad and unhappy all the time
2	0 I am not particularly discouraged about the future 1 I feel discouraged about the future 2 I have nothing to look forward to 3 I feel the future is hopeless and things cannot improve
3	0 I do not feel like a failure 1 I feel I have failed more than the average person 2 As I look back on my life all I can see is a lot of failure 3 I feel I am a complete failure as a person
4	0 I get as much satisfaction out of things as I used to 1 I don't enjoy things as much as I used to 2 I don't get real satisfaction out of anything anymore 3 I am dissatisfied or bored with everything
5	0 I don't feel particularly guilty

	1 I feel guilty a good part of the time 2 I feel quite guilty most of the time I 3 feel guilty all the time
6	0 I don't feel I am being punished 1 I feel I may be punished 2 I expect to be punished 3 I feel I am being punished
7	0 I don't feel disappointed in myself 1 I am disappointed in myself 2 I am disgusted with myself 3 I hate myself
8	0 I don't feel I am any worse than anybody else 1 I am critical of myself for my weaknesses or mistakes 2 I blame myself all the time for my faults 3 I blame myself for everything bad that happens
9	0 I don't have any thoughts of killing myself 1 I have thoughts of killing myself but I would not carry them out 2 I would like to kill myself 3 I would kill myself if I had the chance
10	0 I don't cry any more than usual

	1	I cry more now than I used to I
	2	cry all the time now
	3	I used to be able to cry, but now I can't cry even if I want to
11	0	I am no more easily angered or irritated by things than I ever was
	1	I am slightly more easily angered or irritated by things than usual
	2	I am quite annoyed or irritated a good deal of the time
	3	I feel annoyed or irritated all the time
12	0	I have not lost interest in other people
	1	I am less interested in other people than I used to be
	2	I have lost most of my interest in other people
	3	I have lost all my interest in other people
13	0	I make decisions as well as I ever could
	1	I put off making decisions more than I used to
	2	I have greater difficulty making decisions than I used to I
	3	can't make decisions at all anymore
14	0	I don't feel I look any worse than I used to
	1	I am worried I am looking old or unattractive
	2	I feel there are permanent changes in my appearance that make me look unattractive
	3	I believe I look ugly
15	0	I can work about as well as before

	1 It takes extra effort to get started at doing something I 2 have to push myself very hard to do anything 3 I can't do any work at all
16	0 I can sleep as well as usual 1 I don't sleep as well as I used to 2 I wake up 1-2 hours earlier than usual and find it hard to go back to sleep 3 I wake up several hours earlier than I used to and I can't go back to sleep
17	0 I don't get more tired than usual 1 I get tired more easily than I used to 2 I am tired from doing almost anything 3 I am all too tired to do anything
18	0 My appetite is no worse than usual 1 My appetite is not as good as it use to be 2 My appetite is much worse now 3 I have no appetite at all
19	0 I have not lost much weight, if any, lately 1 I have lost more than 2 kilos 2 I have lost more than 5 kilos 3 I have lost more than 7 kilos

20	0 I am not more worried about my health as usual 1 I worried about physical problems such as pains, aches, stomach upset or constipation 2 I am very worried about my physical problems it's hard to think of much else 3 I am so worried about my physical problems that I cannot think of anything else
21	0 I have not noticed any recent change in my interest in the opposite sex 1 I am less interested in the opposite sex than I used to be 2 I have almost no interest in the opposite sex 3 I have lost interest in the opposite sex completely

Total score……..

Score	Interpretation
17 -20	Mild depression
21-30	Moderate depression
Above 30	Severe depression

Appendix B Permission Letters

GHANA HEALTH SERVICE ETHICAL REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

My Ref. :GHS-ERC: 3
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra

Tel: +233-0302-681109
Fax + 233-0302-685424
Email:
Hannah.Frimpong@ghsmail.org
28th May, 2015

Addom Nana Ama Selasie
Department of Psychiatry
Korle-Bu Teaching Hospital
Accra

ETHICAL APPROVAL FOR AMENDMENT - GHS-ERC21/02/15
RE-Request for Amendments to Protocol titled: "Depression and anxiety disorders among adolescents with epilepsy in Accra, Ghana"

Reference is made to your letter dated 17th April, 2015, requesting permission to implement amendment 1 version of the above-mentioned on-going Study Protocol.

Please be informed that the Committee has reviewed the request and is satisfied with the explanation thereof. We therefore wish to inform you that ethical approval is hereby granted for you to implement the Amendment 1 to the Protocol.

The approval covers the following only:

- **Increase of study sites from 2 to 4.**
- **Change of inclusion criteria from age 12 to 19 years to 10 to 19 years.**
- **Change of exclusion criteria from adolescent without 6 years of formal education to adolescents without 5 years of formal education.**

This approval requires that you submit periodic review of the protocol to the Committee and a final full review to the Ethical Review Committee (ERC) on completion of the study. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification of the project must be submitted to the ERC for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the ERC within seven days verbally and fourteen days in writing.

1

GHANA HEALTH SERVICE ETHICAL REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: Hannah. Frimpong@ghsmail.org

My Ref. :GHS-ERC: 3
Your Ref. No.

23rd March, 2015

Addom Nana Ama Selasie
Department of Psychiatry
Korle-Bu Teaching Hospital
Accra

ETHICAL APPROVAL - ID NO: GHS-ERC: 21/02/15

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

"Depression and anxiety disorders among adolescents with epilepsy in Accra, Ghana"

This approval requires that you inform the Ethical Review Committee (ERC) when the study begins and provide Mid-term reports of the study to the Ethical Review Committee (ERC) for continuous review. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within seven days verbally and fourteen days in writing.

You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

In case of reply the number
HOSPITAL
and the date of this letter
AUTHORITY
should be quoted.

My Ref. No. MHA/APH/G-109

Your Ref. No:

ACCRA PSYCHIATRIC

MENTAL HEALTH

P. O. BOX 1305,
ACCRA. GHANA.

23rd December, 2014

The Chairman
Ghana Health Service
Ethics Review Committee
Adabraka-Accra

Dear Sir,

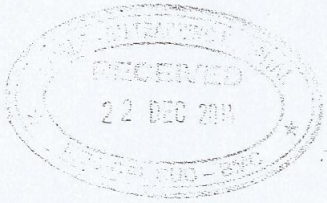
STUDY: DEPRESSION AND ANXIETY DISORDERS AMONG ADOLESCENTS WITH EPILEPSY IN ACCRA, GHANA: PREVALENCE AND CORRELATES

The Accra Psychiatric Hospital has granted permission to Dr Selasie Addom to carry out the above study at the out-patient department of the facility.

We will follow the data collection and subsequently dissemination of the findings.

Yours faithfully,

Dr. Pinaman Appau
Specialist Psychiatrist
for: Dr. Akwesi Osei
(Chief Psychiatrist)



Department of Psychiatry,
Korle-Bu Teaching Hospital,

Accra, Ghana.

19th December, 2014.

The Head of Department,
Department of medicine,
Korle Bu Teaching Hospital,
Accra, Ghana.

Through;

The Head,
Neurology Unit, Department of Medicine,
Korle Bu Teaching Hospital,
Accra, Ghana.

Dear Madam,

Permission to Conduct Study at the Neurology Clinic

My name is Dr Selasie Addom, I am a resident in Psychiatry at the Ghana College of Physicians and Surgeons and also pursuing a Masters degree in Child and Adolescent Mental Health at the University of Ibadan, Nigeria.

My dissertation for the Masters program on the topic: Depression and Anxiety disorders among adolescents with epilepsy in Accra, Ghana: Prevalence and Correlates. I will be using screening instruments and diagnostic interviews to determine the presence of depression anxiety symptoms among adolescents with epilepsy attending the clinic.

I write to seek permission to collect my data from your department.

Thank you.

(1) HOD
Forwarded for your approval
she is awaiting other clearance
22/12/2014

Sincerely,

Selasie Addom

Dr Selasie Addom
(Msc Student/Resident)

Approved
Mohty
23/12/14

Department of Psychiatry,
Korle-Bu Teaching Hospital,

Accra, Ghana.

19th March, 2015.

The Medical Director,

Pantang hospital,

Accra.

Dear Madam,

Permission to Conduct Study at the Outpatient Department

My name is Dr Selasie Addom, I am a resident in Psychiatry at the Ghana College of Physicians and Surgeons and also pursuing a masters degree in Child and Adolescent Mental Health at the University of Ibadan, Nigeria. My dissertation for the masters program on the topic: Depression and Anxiety disorders among adolescents with epilepsy in Accra, Ghana: Prevalence and Correlates. I will be using the Beck's Anxiety and Depression inventories to determine anxiety and depressive symptoms, review patients' folders and I will collect socio-demographic data as well.

I write to seek permission to collect my data from your facility. I have been given conditional ethical clearance by the Ghana Health Service Ethics Review Board and I am awaiting full clearance subject to some corrections in my protocol which I have done and submitted.

Thank you.

Selasie Addom

Dr Selasie Addom

(Msc Student/Resident)

Approved
20.03.15

MA. Head of the Records Dept

DEPARTMENT OF MEDICINE

KORLE BU TEACHING HOSPITAL
P. O. BOX KB 77,
KORLE BU, ACCRA.

Tel: +233 302 667759/673034-6
Fax: +233 302 667759
Email: Info@kbth.gov.gh
pr@kbth.gov.gh
Website: www.kbth.gov.gh

In case of reply the number
And the date of this
Letter should be quoted

My Ref. No.....
Your Ref. No.....

23rd December, 2014

The Chairman,
GHS,
Ethics Review Committee,
Adabraka,
Accra.

Dear Sir,

STUDY: DEPRESSION AND ANXIETY DISORDERS AMONG ADOLESCENTS WITH EPILEPSY IN ACCRA, GHANA: PREVALENCE AND CORRELATES

The department of medicine, KBTH has granted permission to Dr. Selasie Addom to carry out the above study at the Neurology Out-Patient Clinic.

We will follow keenly the data collection and subsequently dissemination of findings.

Yours faithfully,

M Lartey

PROF. MARGARET LARTEY
HEAD OF DEPARTMENT

DEPT. OF MEDICINE & THERAPEUTICS
KORLE - BU TEACHING HOSPITAL
P. O. BOX 77
KORLE - BU

Department of Psychiatry,
Korle-Bu Teaching Hospital,

Accra, Ghana.

19th March, 2015.

The Medical Superintendent,

PML Children's hospital,

Accra.

Dear Sir,

Permission to Conduct Study at the Neurology Clinic

My name is Dr Selasie Addom, I am a resident in Psychiatry at the Ghana College of Physicians and Surgeons and also pursuing a masters degree in Child and Adolescent Mental Health at the University of Ibadan, Nigeria. My dissertation for the masters program on the topic: Depression and Anxiety disorders among adolescents with epilepsy in Accra, Ghana: Prevalence and Correlates. I will be using the Beck's Anxiety and Depression inventories to determine anxiety and depressive symptoms, review patients' folders and I will collect socio-demographic data as well.

I write to seek permission to collect my data from your facility. I have been given conditional ethical clearance by the Ghana Health Service Ethics Review Board and I am awaiting full clearance subject to some corrections in my protocol which I have done and submitted.

Thank you.

Dr Selasie Addom

(Msc Student/Resident)

Approved

23/03/15