



Estimation of serum prolactin in children admitted with seizure disorders

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Abstract

Most cases of seizure occur as the result of central nervous system infection, brain injury, stroke, brain tumors, and birth defects, through a process known as epileptogenesis. The etiology in many cases of seizure disorder remains largely unknown. Sometimes it may be very difficult to differentiate between true seizures and seizure like illnesses (Pseudoseizure), even by experienced clinicians. EEG is many times not readily available and also not highly specific or sensitive. Several investigators have now reported elevated plasma Prolactin levels in patients with epileptic seizures (1-3).

The aim of this study was to establish the fact that plasma Prolactin level estimation may be of great importance in the differentiation of true epileptic seizures from Pseudoseizure.

The study was planned in the department of Biochemistry, Patna medical College, Patna. 120 patients diagnosed with seizure were enrolled in the study. The cases were divided into four groups, each having 30 members. Blood samples were collected after 2 hours of the seizure episode or at the time of presentation, whichever was later. Then serum prolactin estimation was done by chemiluminescence method. Prolactin levels were found to be significantly higher in all seizure subtypes in comparison to pseudoseizure.

Our observations in this study suggested that plasma Prolactin level may be measured in children with seizure especially when there is difficulty in separating the cases of true seizure from pseudoseizure clinically. This may be very useful in children with functional neurological disorders also. Larger studied are further required.

Keywords: serum prolactin, seizure, epilepsy, etc.

Introduction

Epileptic seizures are episodes that can vary from brief and nearly undetectable periods to long periods of vigorous shaking. These episodes can result in physical injuries. In epilepsy, seizures tend to recur and, as a rule, have no immediate underlying cause. Isolated seizures that are provoked by a specific cause such as poisoning are not deemed to represent epilepsy. People with epilepsy in some areas of the world experience varying degrees of social stigma due to their condition [1].

The cause in many cases of epilepsy is unknown. Most cases occur as the result of CNS infections, stroke, brain tumors, and birth defects, through a process known as epileptogenesis. [1][2][3]. Known genetic mutations are directly linked to a small proportion of cases. Epileptic seizures are the result of excessive and abnormal neuronal activity in the cortex of the brain. The diagnosis involves ruling out other conditions that might cause similar symptoms, such as fainting, breath holding spells, acute psychosis etc. and determining if another cause of seizures is present, such as alcohol withdrawal or electrolyte problems. This may be partly done by imaging the brain and performing blood tests. Epilepsy can often be confirmed with an electroencephalogram (EEG), but a normal test does not rule out the condition [4]. The word epilepsy is from Ancient Greek word which means "to seize, possess, or afflict" [5].

The most common type (60%) of seizures is convulsive. Of

these, one-third begins as generalized seizures from the start, affecting both hemispheres of the brain. Two-thirds begin as focal seizures (which affect one hemisphere of the brain) which may then progress to generalized seizures. The remaining 40% of seizures are non-convulsive. An example of this type is the absence seizure, which presents as a decreased level of consciousness and usually lasts about 10 seconds [6].

Focal seizures are often preceded by certain experiences, known as auras. They include sensory (visual, hearing, or smell), psychic, autonomic, and motor phenomena [2]. Jerking activity may start in a specific muscle group and spread to surrounding muscle groups in which case it is known as a Jacksonian march. Automatism may occur, which are non-consciously-generated activities and mostly simple repetitive movements like lip smacking or more complex activities such as attempts to pick up something. The main types of generalized seizures are: tonic-clonic, tonic, clonic, myoclonic, absence and atonic seizures. They all involve loss of consciousness and typically happen without warning [7].

Tonic-clonic seizures occur with a contraction of the limbs followed by their extension along with arching of the back which lasts 10–30 seconds (the tonic phase). The tongue may be bitten during a seizure. Tongue bites are also relatively common in psychogenic non-epileptic seizures [8]. Myoclonic seizures involve spasms of muscles in either a few areas or all over. Absence seizures can be subtle with only a slight turn of the head or eye blinking. The person does not fall over and

returns to normal right after it ends. Atonic seizures involve the loss of muscle activity for greater than one second. This typically occurs on both sides of the body [8].

Prolactin is a hormone produced by the Pituitary gland in the brain. Prolactin is important for both male and female reproductive health. There are many methods for estimation of serum Prolactin levels, ELISA and chemiluminescence immunoassay (CLIA) being the two commonly used. Normal values of Prolactin vary greatly in different age groups. In most studies on relationship of Prolactin with seizure disorders, a value twice the normal upper limit is taken as cut-off.

Several investigators have now reported elevated plasma Prolactin levels in patients with epileptic seizures (1-3). The aim of this study was to establish the fact that plasma Prolactin level estimation may be of great importance in the differentiation of epileptic seizures from pseudoseizures.

Methodology

The study was planned in department of Biochemistry, Patna Medical College, Patna with the help of department of Pediatrics. Study period was from 1st November 2016 to 31st October 2017. A total of 120 patients, in the age group 1 year to 12 years, admitted with seizure or seizure like illness in

department of paediatrics were enrolled in the study. Patients who were critically ill or were having convulsions for long durations were excluded. Informed consents were taken from relatives in all cases. The cases were divided into four groups, each having 30 members. Group 1 consisted of patients with generalized tonic clonic seizures, group 2 had patients with complex partial seizures, group 3 with simple partial seizures and group 4 had patients admitted with seizure like illnesses (Pseudoseizures). Proper statistical methods were used for analysis of results.

Blood samples were collected after 2 hours of the seizure episodes or at the time of presentation, whichever was later. 1 ml of free flowing blood was collected after venipuncture in a sterile plain vial. Then serum Prolactin estimation was done by chemiluminescence immunoassay (CLIA) method using CLIA kits for Prolactin estimation and microplate luminometers. A cut-off level of 23 ng/ml was taken above which prolactin levels were considered high.

Results & Discussion

The data from the 120 patients were collected and presented as below. The Serum prolactin level estimated in various seizure patients in different age group is presented in the following tables.

Table 1: Age, Patient group and Serum Prolactin levels

Age	No. of Patients	Serum Prolactin Level (ng/ml)
Generalized Tonic Clonic Seizure (Group 1)		
1 year – 3 years	7	30.5 – 34.6 (Mean=32.8)
3 years – 6 years	9	32.8 – 38.2 (Mean=35.9)
6 years – 9 years	8	24.8 – 48.6 (Mean=38.8)
9 years – 12 years	6	26.5 – 51.6 (Mean=37.9)
Total	30	
Complex Partial Seizure (Group 2)		
1 year – 3 years	8	20.6 – 36.5 (Mean=31.3)
3 years – 6 years	8	35.6 – 42.2 (Mean=38.7)
6 years – 9 years	5	19.1 – 23.6 (Mean=22.6)
9 years – 12 years	9	31.5 – 38.1 (Mean=34.9)
Total	30	
Simple Partial Seizure (Group 3)		
1 year – 3 years	4	23.5 – 27.8 (Mean=25.1)
3 years – 6 years	12	16.5 – 20.1 (Mean=19.1)
6 years – 9 years	6	18.5 – 21.7 (Mean=19.2)
9 years – 12 years	8	22.6 – 24.5 (Mean=23.1)
Total	30	
Pseudoseizure (Group 4)		
1 year – 3 years	6	14.6 – 19.2 (Mean=17.2)
3 years – 6 years	12	12.2 – 14.5 (Mean=13.1)
6 years – 9 years	7	15.8 – 18.5 (Mean=17.2)
9 years – 12 years	5	11.4 – 14.5 (Mean=12.8)
Total	30	

Data were collected in the above 4 groups of patients. The data of the observed prolactin in the Generalized Tonic Clonic Seizure, Complex Partial Seizure and Simple Partial Seizure was compared with the Pseudoseizure group which was also taken as the control study group. Postictal serum Prolactin levels were increased in all true seizure groups, especially GTCS group. Prolactin levels were surprisingly normal in Complex Partial seizure group (age 6-9 years), the cause of which could not be ascertained. Serum Prolactin

levels were below the cut-off level in all age groups of patients admitted with pseudoseizure.

Increased level of serum prolactin level has a potential role in the differentiation of true epileptic seizures from pseudo seizures. The findings of our study are parallel to the findings of the studies done by Trimble MR *et al.* [9], Abbott RJ *et al.* [10], Collins WCJ *et al.* [11], who also found the levels of serum prolactin to rise drastically in case of true epileptic seizures and no rise in cases with pseudo seizure.

The result of this study is also in confirmation with the previous observations that serum prolactin increases more following generalized seizures. Our findings confirm that plasma prolactin levels did not rise significantly following pseudoseizures. This study suggests that estimation of plasma Prolactin is useful in differentiating generalized seizures with pseudoseizures.

It is known that prolactin is increased in situations characterized by stress, arousal and hypoglycaemia (6). Certain drugs like chlorpromazine, butyrophenones and methyldopa increase Prolactin secretion. Exercise can lead to small rises [13]. However, in the above situations the rise is minimal and well within normal range, whereas in case of generalized seizures there is a significant rise.

Hypothalamus has predominant inhibitory control on Prolactin secretion. Dopamine appears to be the major inhibitory transmitter involved. It is possible that a rise in plasma Prolactin occurs only when the abnormal electrical discharge in an epileptic seizure passes through the hypothalamic region.

Conclusion

It can be concluded by this study that plasma Prolactin level increases with true epileptic seizures, especially generalized tonic clonic seizures. Serum Prolactin should be measured in the children with seizure, especially when there is difficulty in separating the cases of seizure from pseudoseizure clinically. This can also be very useful in children with functional neurological disorders. More multicentric studies with larger sample sizes are recommended for further validating these observations.

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