

A COHORT CONCURRENT OBSERVATIONAL STUDY ON DESCRIPTIVE EPIDEMIOLOGY OF EPILEPSY

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Abstract : Epilepsy, a neurological condition which affects all ages, most commonly children. But the studies regarding the epidemiological rates were very few. In this study, we present the percentage analysis, estimates of ratios, confidence intervals and probability values of epilepsy along with the age and gender wise distributions of epileptic patients, type and frequency of seizures, family history, clustering, age of onset, time of occurrence, MRI imaging and anti-convulsants prescribed to pediatrics in Warangal. The study was conducted in Rohini super specialty hospital and Sri Sri Neuro clinic in Hanamkonda. 217 epileptic cases were included and the details of the cases were recorded and the data was documented, analyzed, quantified and validated. Ratios, Confidence Interval and Probability were the key parameters. From the results it was found that 48% of cases were pediatrics, which indicates the importance of epidemiological studies in pediatric population. The family history of epileptic patients and clustering were found to be less significant and the predominant types of seizures were the generalized ones. From the MRI imaging in the pediatrics, it was found that 45% were diagnosed with calcified granulomatous lesions in right fronto-parietal region and lacunar lesions in ventricular regions. The ratio of males-females is 1.89:1 and the 95% Confidence Interval for males is 0.654 and for females, it is 0.346 and the Probability (p) value is 5.40922E-06.

IndexTerms - Confidence Interval, Probability, Observational study.

I.INTRODUCTION

Epilepsy is defined as a condition characterized by recurrent (two or more) epileptic seizures, unprovoked by any immediate identified cause (Hauser and Kurland, 1975; ILAE, 1993)¹. It is the most frequent chronic neurologic condition, which affects 0.5% to 1% of children². But the information regarding the overall disease burden of childhood epilepsy is also insufficient. Diagnostic accuracy is a particular problem in epilepsy as seizures normally do not have any physical manifestations and are a symptom of diverse underlying cerebral aetiologies³. They may be Idiopathic, Symptomatic and Cryptogenic. There are factors such as consanguineous parents, head injury and infection (abscess, meningitis or encephalitis) for which a direct casual relationship could be assumed. In countries with high income, incidence rates appear to be declining. According to Kari Modalsli Aaberg et.al, an incidence rate of epilepsy of 144 per 100000 person-years in the first year of life and 58 per 100000 person-years through the following years up to age 10 years. The cumulative incidence was 0.45% at age 5 and 0.66% at age 10 years. And with the definition of seizures within the last 2 years and/or ongoing AED treatment, the prevalence was 0.50% at age 10.² In this study, we present the age and gender wise distributions of epilepsy, type and frequency of seizures, family history, clustering, age of onset, time of occurrence, MRI imaging, anti-convulsants prescribed to pediatrics and estimates of incidence rate and prevalence of epilepsy from the “Rohini super specialty hospital” and “Sri-Sri neuro centre, Hanamkonda, Warangal, Telangana. We combined information from multiple sources: questionnaires provided to patients, medical records, and parental interviews. All epilepsy cases were documented and validated.

II.METHODOLOGY

It is a Cohort concurrent observational study, which was carried out for a period of 5 months in Neurology department of “Rohini super specialty hospital” and “Sri-Sri neuro centre”, located in Hanamkonda, Warangal, Telangana, India. All the patients consulting the physician with the symptoms of seizures and epilepsy of either sex and both pediatric and adults have been included in the study. The exclusion criteria were geriatric patients, psychologically imbalance patients and pregnant women. The patients who met the study criteria were followed and informed consent was taken. The information regarding patient's age, gender, BMI, semiology, type and frequency of seizures, age of onset, presence or absence of clusters, family history, history of head injury, laboratory investigations and details regarding drug therapy for pediatrics were recorded in the suitable data collection form as per the need of the study. All the recorded data was documented, analyzed, quantified and validated. Ratios, Confidence Interval and Probability were the key parameters. The differentiation of results of every parameter mentioned was done between pediatrics and adults and was noted.

III.STATISTICAL ANALYSIS

Data was analysed using chi-square test. The percentage analysis, estimates of ratios, confidence intervals and probability values of epilepsy give information regarding its epidemiology.

IV. RESULTS AND DISCUSSION

In this present study, the patients were categorized into various factors like: age, gender, type, frequency, age and time of onset of seizures, clustering, family history, MRI investigations, drugs used etc. The detailed results were as follows:

4.1 Gender wise distribution of sample population:

According to Jyoti Upadhyay, in a study Data was analysed using chi-square test. The percentage analysis, estimates of ratios, confidence intervals and probability values of epilepsy give information regarding its epidemiology including 200 patients 130(65%) were males and 70(35%) were females⁴. In the articles by John C. Mc Hugh, Jakob Christensen, W Allen Hauser and Sumio Ishida, the occurrence of epilepsy was higher in males than females^{5, 6, 7, 8}.

In this study, being the same, the significant occurrence of epilepsy was strongly associated with male population. Among 217 patients, males were predominant with 65% (n=142) and females were with 35% (n=75) (Fig. 1). The ratio of males-females (M/F) is 1.89:1. The 95% Confidence Interval for males is 0.654(lower bound: 0.587 and upper bound: 0.717) and for females, it is 0.346 (lower bound: 0.283 and upper bound: 0.413). The Probability (p) value is 5.40922E-06.

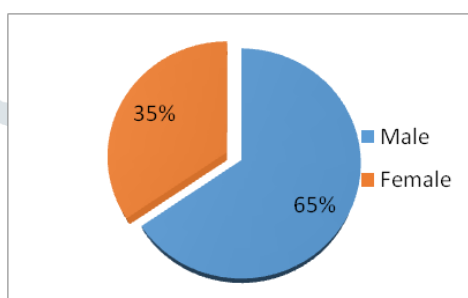


fig.1: gender wise distribution

4.2 Age wise distribution of sample population:

Jyoti Upadhyay stated that the age wise distribution of epilepsy showed that 44% were prevalent among age group between 30 and 40 years⁴. According to Thomas Varghese Attumalil, there were 82 children enrolled with epilepsy and 160 control children. Cases had a higher mean age 6.9 + 3.6 years (95% confidence interval [CI] 5.2–8.4) when compared with controls where the mean age was 5.2 + 3.1 years (95% CI). The difference in age between the two groups (1.8 years) was significant (95% CI = – 2.63 to -0.886; $P < 0.01$)¹¹

In this study, Epilepsy is more predominant among the children of age 1-18 years with 48% (n=104) and 95% Confidence Interval of 0.479(lower bound: 0.411 and upper bound: 0.548), followed by 19-25 years with 15% (n=32) and 95% Confidence Interval of 0.147 (lower bound: 0.103 and upper bound: 0.202), 36-45 years with 13% (n=28) and 95% Confidence Interval of 0.129 (lower bound: 0.087 and upper bound: 0.181), 26-35 years with 12 % (n=26) and 95% Confidence Interval of 0.120(lower bound: 0.080 and upper bound: 0.171), 46-55years with 10% (n=22) and 95% Confidence Interval of 0.101(lower bound: 0.065 and upper bound: 0.149), 56-65years with 2% (n=5) and 95% Confidence Interval of 0.023 (lower bound: 0.008 and upper bound: 0.053) (Fig. 2). The Probability (p) value is 9.17167E-34

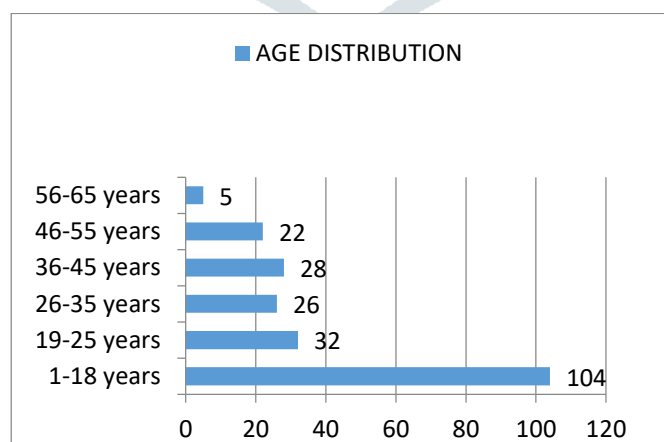


fig.2: age wise distribution

4.3 Age range of sample population: According to Alex D Everitt, in a prospective population based study of 564 cases, only 25% of patients were paediatrics⁹.

Contrary, in this study, the ratio of Paediatrics-Adults in the sample population is 1:1.08, with paediatrics of 48% (n=104) and adults of 52% (n=113). The 95% Confidence Interval for paediatrics is 0.479 (lower bound: 0.411 and upper bound: 0.548) and for adults, it is 0.521 (lower bound: 0.452 and upper bound: 0.589). The Probability (p) value is 0.541226188.

4.4 Family history of sample population:

According to Indar Kumar Sharawat, a positive family history of febrile seizures was found in 22 cases in first degree relatives (31.4%; p-value<0.05) and in 8 cases (11.4%; p-value<0.003) in second degree relatives which was statistically significant as compared to controls.¹⁰

In this study population, the family history of the epilepsy patients was taken during the patient interview. Among 217 patients, family history was found to be not much significant with current epileptic patients and it was found to be 19% (n=41) with 95% Confidence Interval of 0.189 (lower bound: 0.139 and upper bound: 0.247). The Probability (p) value is 4.98247E-20.

4.5 Frequency of seizures in sample population:

The sample size was categorized according to number of episodes observed in each patient. It was noted that 37.7% (n=82) of the total sample population were manifesting with 1-2 seizure episodes with 95% Confidence Interval of 0.378 (lower bound: 0.313 and upper bound: 0.446), which is followed by 30.8% (n=67) with 3-5 episodes with 95% Confidence Interval of 0.309 (lower bound: 0.248 and upper bound: 0.375), 17.05% (n=37) with 6-10 episodes with 95% Confidence Interval of 0.171, (lower bound: 0.123 and upper bound: 0.227), 11.9% (n=26) with recurrent i.e., 11-25 episodes and more with 95% Confidence Interval of 0.120 (lower bound: 0.080 and upper bound: 0.171) Additionally, 1.38% (n=3) samples were non-significant with 95% Confidence Interval of 0.014 (lower bound: 0.003 and upper bound: 0.040) ; 0.31% (n=1) had 6-7 episodes since last 8 years with 95% Confidence Interval of 0.005 (lower bound: 0.000 and upper bound: 0.025) and 0.31% (n=1) manifest with 2-3 episodes a year with 95% Confidence Interval of 0.005 (lower bound: 0.000 and upper bound: 0.025) (Fig. 3). The Probability (p) value is 8.48724E-43.

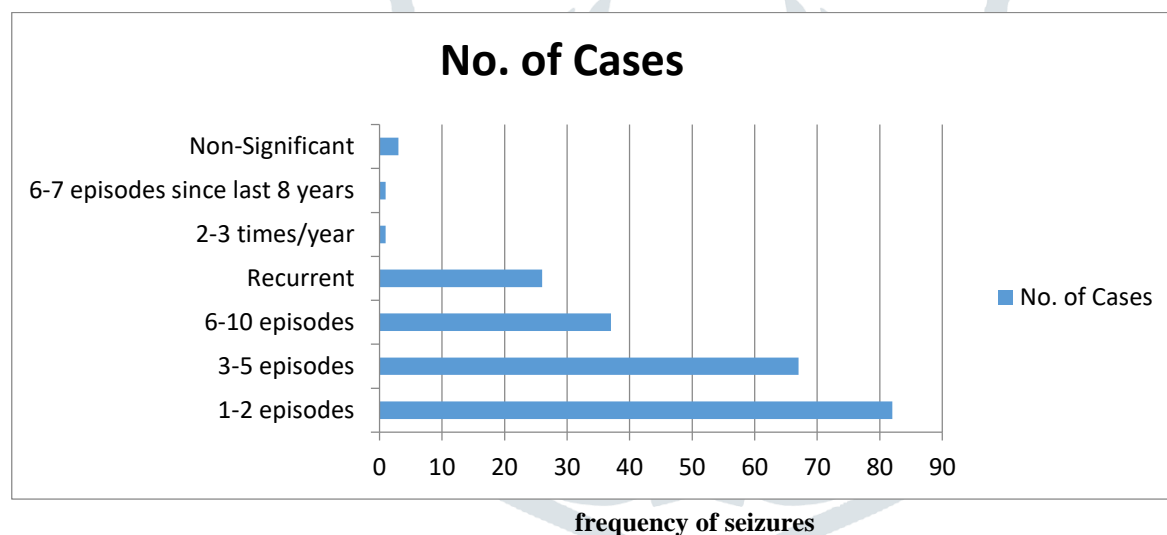


fig.3:

4.6 Time of occurrence in sample population:

The time of occurrence of seizures play an important role in designing the drug therapeutic regimen. As per this study, 57% (n=124) have Day-time seizures with 95% Confidence Interval of 0.571 (lower bound: 0.503 and upper bound: 0.638) while, 19% (n=41) have Nocturnal ones with 95% Confidence Interval of 0.189 (lower bound: 0.139 and upper bound: 0.247) and 24% (n=52) were having both nocturnal and day-time seizures with 95% Confidence Interval of 0.240 (lower bound: 0.184 and upper bound: 0.302). The ratio of daytime-nocturnal-both seizures is 3.02:1:1.26. The Probability (p) value is 6.2685E-13.

4.7 Age of onset in sample population:

Thomas Varghese Attumalil, stated that there were 30 children with age of onset earlier than 1 year (24 of them had history of newborn distress) and 50 with age of onset later than 1 year (27 of them had history of newborn distress). Higher frequency of newborn distress was seen in those who had onset of epilepsy earlier than 1 year of age (OR 3.41, 95% CI 1.19-9.77, P=0.016).¹¹

Patient interview was conducted and information regarding the age of onset of seizures was noted. Predominantly, 27% (n=58) of the sample population were having onset in between birth-5 years with 95% Confidence Interval of 0.267 (lower bound: 0.210 and upper bound: 0.331) , followed by 23% (n=51) in between 6-10 years with 95% Confidence Interval of 0.235 (lower bound: 0.180 and upper bound: 0.297), 21% (n=47) in between 11-20 years with 95% Confidence Interval of 0.217 (lower bound: 0.164 and upper bound: 0.277), 13% (n=28) in between 21-30 years with 95% Confidence Interval of 0.129 (lower bound: 0.087

and upper bound: 0.181), 9% (n=19) in between 31-40 years with 95% Confidence Interval of 0.088 (lower bound: 0.054 and upper bound: 0.133), 4% (n=8) in between 41-50 years with 95% Confidence Interval of 0.037 (lower bound: 0.016 and upper bound: 0.071), 3% (n=6) in between 51-60 years with 95% Confidence Interval of 0.028 (lower bound: 0.010 and upper bound: 0.059) (Fig. 4). The Probability (p) value is 1.37261E-16.

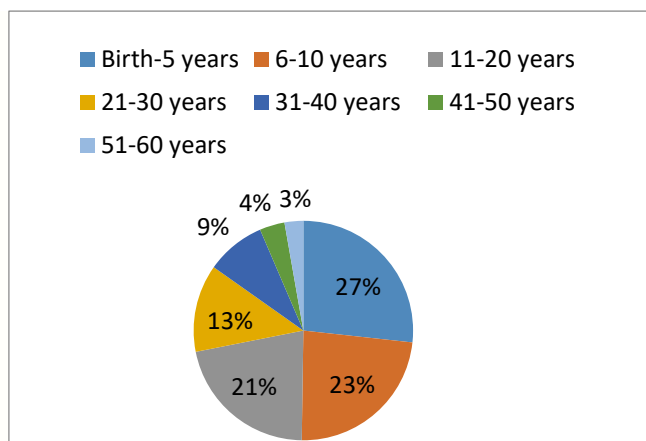


fig. 4: age of onset

4.8 Clustering in sample population: Sheryl R Haut stated that, out of 91 patients clustering was present in 56 (61.5%)¹².

Seizures can either occur in groups or in clusters. In this study, the presence of clustering is not so significant or predominant in the present sample population. It was found to be 19.35% (n=42) with 95% Confidence Interval of 0.194 (lower bound: 0.143 and upper bound: 0.252). The ratio of presence and absence of clustering is 1:4.16. The Probability (p) value is 1.73837E-19.

4.9 Type of seizures in sample population:

In the article by Jyoti Upadhyay, the primary generalized seizures were most common (62%)⁴.

In this study, being the same, the predominant type of seizures were the generalized ones with 52% (n=113) with 95% Confidence Interval of 0.521 (lower bound: 0.452 and upper bound: 0.589), followed by complex-partial with 15% (n=33) with 95% Confidence Interval of 0.152 (lower bound: 0.107 and upper bound: 0.207), focal and generalized with 15% (n=32) with 95% Confidence Interval of 0.147 (lower bound: 0.103 and upper bound: 0.202), generalized and myoclonic with 10% (n=22) with 95% Confidence Interval of 0.101 (lower bound: 0.065 and upper bound: 0.149), focal with 3% (n=6) with 95% Confidence Interval of 0.028 (lower bound: 0.010 and upper bound: 0.059), generalized and provoked with 2% (n=5) with 95% Confidence Interval of 0.023 (lower bound: 0.008 and upper bound: 0.053), generalized tonic-clonic with 2% (n=4) with 95% Confidence Interval of 0.018 (lower bound: 0.005 and upper bound: 0.047) and provoked seizures with 1% (n=2) with 95% Confidence Interval of 0.009 (lower bound: 0.001 and upper bound: 0.033) (Fig. 5). The Probability (p) value is 3.63864E-72.

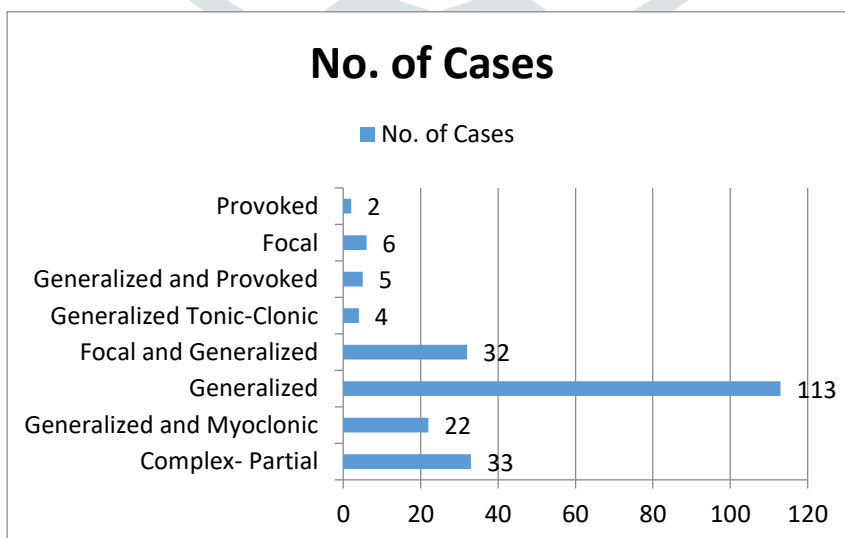


fig. 5: types of seizures

4.10 MRI Imaging in sample population:

Among the 217 patients, 152 underwent with MRI scanning. Out of them, 96 were Pediatrics and 56 were Adults. Out of the 96 pediatric samples, 25% were diagnosed normal (n=24) with 95% Confidence Interval of 0.111 (lower bound: 0.072 and upper bound: 0.160), 45% were diagnosed with calcified granulomatous lesion in right fronto-parietal region and lacunar lesions in ventricular regions (n=43) with 95% Confidence Interval of 0.198 (lower bound: 0.147 and upper bound: 0.257) and 30% with multiple frontal granuloma and left occipital-right parietal granuloma (n=29) with 95% Confidence Interval of 0.134 (lower bound: 0.091 and upper bound: 0.186) (Table 1). Out of the 56 adult samples, 7% were diagnosed normal (n=4) with 95% Confidence Interval of 0.018 (lower bound: 0.005 and upper bound: 0.047), 32% were diagnosed with small vessel ischemic changes with Neurocysticercosis (n=18) with 95% Confidence Interval of 0.083 (lower bound: 0.050 and upper bound: 0.128), 21% with gliosis in right temporal lobe (n=12) with 95% Confidence Interval of 0.055 (lower bound: 0.029 and upper bound: 0.095), 18% with hypoplastic right transverse sigmoid sinuses (n=10) with 95% Confidence Interval of 0.046 (lower bound: 0.022 and upper bound: 0.083), 18% with lesions in right parietal lobe and frontal lobe (n=10) with 95% Confidence Interval of 0.046 (lower bound: 0.022 and upper bound: 0.083) and 4% with right mesial temporal lobe sclerosis (n=2) with 95% Confidence Interval of 0.009 (lower bound: 0.001 and upper bound: 0.033) (Table 2). The Probability (p) value is 1.97011E-13.

1. MRI imaging in pediatrics

2. MRI imaging in adults

Investigation	No. of Cases
Calcified Granulomatous Lesion in right fronto-parietal region and Lacunar lesions in ventricular regions.	43
Multiple frontal granuloma and left occipital-right parietal granuloma	29
Normal	24

Investigation	No. of Cases
Hypoplastic right transverse sigmoid sinuses	10
Right mesial temporal lobe sclerosis	2
Small vessel ischemic changes with Neurocysticercosis	18
Lesions in right parietal lobe and frontal lobe	10
Gliosis in right temporal lobe	12
Normal	4

4.11 Anti-Convulsants prescribed to pediatrics in sample population:

In the present study, the drug Levetiracetam was prescribed to 65.38% (n=68), Clobazam to 59.61% (n=62), Oxcarbazepine to 21.15% (n=22), Sodium Valproate to 45.19% (n=47) and Topiramate to 8.65% (n=9) (Fig. 6).

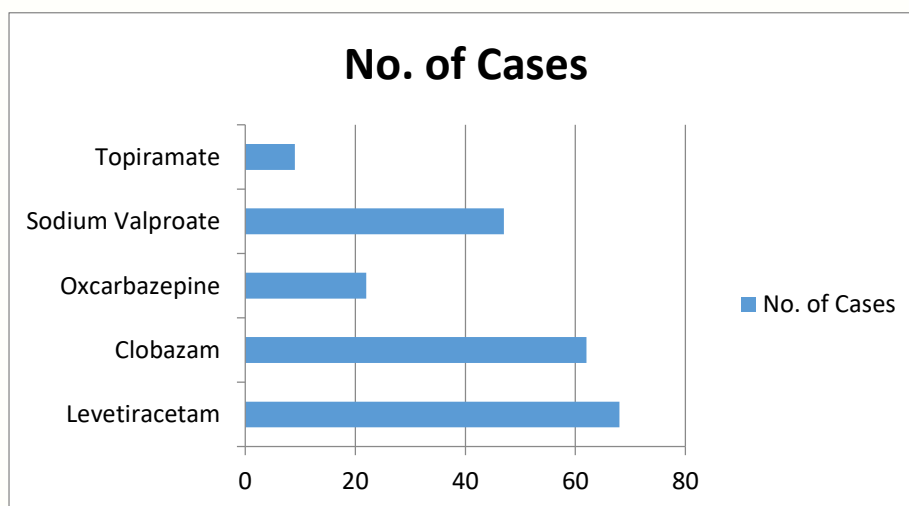


fig. 6: anticonvulsants prescribed to pediatrics

CONCLUSION: Our study shows that Epilepsy is predominant over males and children of age 1-18 years with 1-2 episodes of generalized day-time seizures with less significant to family history and clustering. The percentage analysis, estimates of ratios, confidence intervals and probability values of epilepsy give information regarding its epidemiology.

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Conflicts of interest: No

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