

## “Encephalitis: A Comparative Study in Pediatric and Adult Age Groups”

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**Abstract:** Encephalitis is a neurological disease cause by various agents, which may be viral, bacterial, amebic, parasitic, fungal etc. Again, Immune mediated cause may also be the factor. Our study tried to check the severity risk group of encephalitis in between pediatric and adult group. The study was conduct at district public health laboratory (IDSP) of Lakhimpur district of Assam, India. The data were collected and analyzed from January 2012 to April 2016. It was observed that though the both age groups were affected by the disease but mortality rate is higher in pediatric group. Again, sex wise observation showed that male group was in high risk in comparison with female in both pediatric and adult age group. It was observed in JE test result that maximum JE positive patients were from pediatric age group. To control/treatment the disease patient etiology must be known by the treating physician.

**Keywords:** neurological, severity, risk group, analyze, mortality.

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### I. Introduction

Encephalitis is a disease of neurological syndrome due to inflammation of the brain parenchyma with different aetiologies<sup>[1, 2, 3]</sup>. Encephalitis was first discovered by the pathologist as well as naturalist Sir John Burton Cleland (1878-1971) in 1916. There may be different causative agents for different patients, which could only confirmed by laboratory tests, as the symptoms are almost similar<sup>[2, 3,4]</sup>. The detection of the causative agent is the main burden in the developing countries like India due to non availability of the testing facilities in each locality. However government has developed some laboratories but each having only selected diagnostic facilities like Japanese encephalitis, dengue, leptospirosis etc. This may impact in the treatment. These lead the burden to control the mortality and morbidity rates. In India 150 people dies due to encephalitis in each year<sup>[5]</sup>. This indicates how important the disease in public health.

The main symptoms of encephalitis are fever, headache, seizure, changing mental status etc<sup>[6]</sup>. In western countries out of one lakh people 7.4 acute encephalitis cases reported in each year and in tropical countries this rate is 6.34 per one lakh people<sup>[5,6]</sup>. Encephalitis outbreak depends on the seasonal and geographical variation of the causative organism. Depending on the causative organism it may be mosquito/arthropod borne, water borne, soil borne etc. In Assam some of the causative agents of encephalitis already identified in different studies are Japanese encephalitis (JE), West Nile (WN), Dengue, Chikungunya, leptospirosis, Scrub typhus, malaria etc<sup>[4,5,7,8]</sup>. There are some of the other aetiologies yet to find out. There are different types of encephalitis having vaccination facilities to reduce the burden are JE, measles, mumps, rubella, and varicella<sup>[9]</sup>. There are lots of researches going on to introduce new vaccines of some other cause encephalitis, like dengue. Some of the studies proved that maximum cases of encephalitis are due to viral which is followed by immune mediated, bacterial, amebic, parasitic, fungal etc<sup>[9,10]</sup>. To reduce the disease burden transmission must be prevent. Based on the causing agents transmission routes are different and it must be known by the public to prevent it by them. Our study tried to compare the encephalitis data since January 2012 to April 2016 between adult and pediatric ( $\leq 14$  Years) age groups to check the high risk age group in the study region. Though encephalitis traditionally counted as a children disease, it is already proved in adults too and because of which we tried to compare in both age groups<sup>[11]</sup>.

### II. Materials And Methods

The study was done at District public health laboratory of North Lakhimpur (Lakhimpur) of Assam, India. The details of the encephalitis patients reported to laboratory for different tests as per the specialist doctor's advice were recorded. Blood samples were collected from the clinically diagnosed encephalitis patients as per the advice of specialist doctors and consent either from patient or attendance of the patients were received. The tests mainly MAC ELISA for JE were done as per advice and handed over the reports. Blood samples were collected and allowed to clot for serum separation. Separated serum were preserved at -20 °C and tested for JE MAC ELISA. The patients reported the laboratory are mainly from Lakhimpur, Dhemaaji and

Jorhat districts of Assam as well as from some of the neighboring parts of Arunachal Pradesh. During the time registration and consent in the laboratory data were recorded from patient’ slips and by questioning.

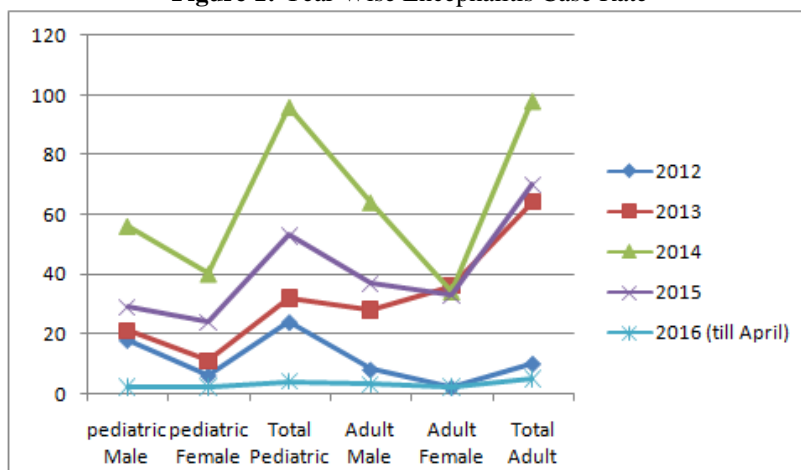
### III. Results

The data were collected and compared with pediatrics and adults groups. Pediatrics group was counted up to 14 (Fourteen) years and above were in adult group. Total 456 encephalitis patients were reported to the laboratory within the study duration i.e. year January 2012 to April 2016. Out of which 45.83 % (209/456) were pediatric and 54.16% (247/456) were adults. Again, out of 209 numbers of pediatric patients 60.28 % (126/209) were male and 39.72 % (83/209) were female whereas out of 247 numbers of adult patients 56.68 % (140/247) were male and 43.31 % (107/247) were female. In both cases male patients were increases in response of female. The Clinical comparative results showed that unconscious, Alt. sensorium, abnormal behavior, paralysis etc are higher in pediatric group in comparison with adults (Table 1). Again body ache, vomiting, abdominal pain higher in adults in comparison with pediatrics. Some of the syndrome likes diarrhea, jaundice, impaired hearing only found in pediatric group and dehydration, chest pain, joint pain, chills, rigor, high blood pressure only found in adult group. The trend of encephalitis showed that the cases increasing 2012 to 2014 and trend decreasing from 2015 (Figure 1). The mortality rate also showed (Figure 2) maximum death in 2015 and highest mortality in pediatric age group. Again test result of Japanese encephalitis (JE) by MAC ELISA showed the maximum positive cases of JE are from pediatric age group (Figure 3).

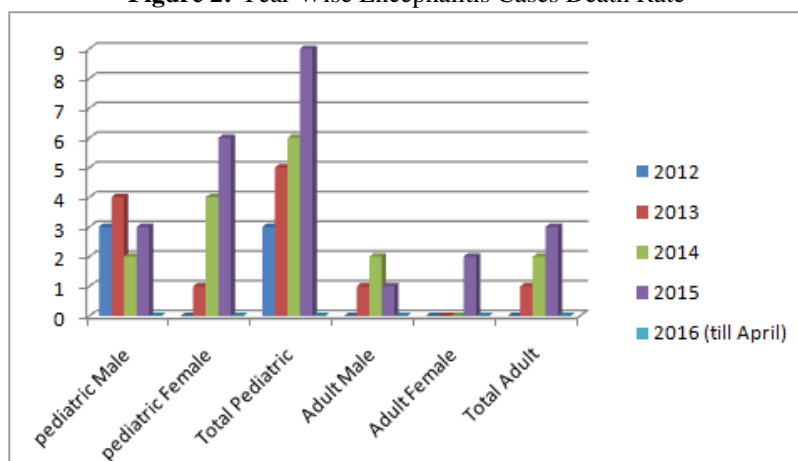
**Table 1:** Clinically Sex Wise Comparison of Pediatric and Adult Encephalitis Cases

Symptoms and signs	Pediatric Male	Pediatric Female	Total Pediatric	Adult Male	Adult Female	Total Adult	Total
Fever	124	82	206	140	107	247	453
Neck rigidity/pain	4	9	13	7	4	11	24
Body ache	9	4	13	52	40	92	105
Vomiting	5	5	10	24	10	34	44
Unconsciousness	41	37	78	26	25	51	129
Alt. Sensorium	27	24	51	17	15	32	83
Giddiness	0	3	3	1	6	7	10
Abdominal pain	2	2	4	6	3	9	13
Convulsion	104	71	175	118	96	214	389
Episodic headache	73	33	106	77	53	130	236
Autonomic disturbance	2	5	7	6	8	14	21
Abnormal behaviour	10	2	12	4	7	11	23
Cough	3	2	5	14	6	20	25
Paralysis	6	5	11	1	2	3	14
Dehydration	0	0	0	2	0	2	2
Chest Pain	0	0	0	4	1	5	5
Diarrhea	1	1	2	0	0	0	2
Jaundice	2	0	2	0	0	0	2
Joint Pain	0	0	0	1	1	2	2
Chills and Rigor	0	0	0	0	2	2	2
High blood Pressure	0	0	0	1	2	3	3
Impaired hearing	1	0	1	0	0	0	1

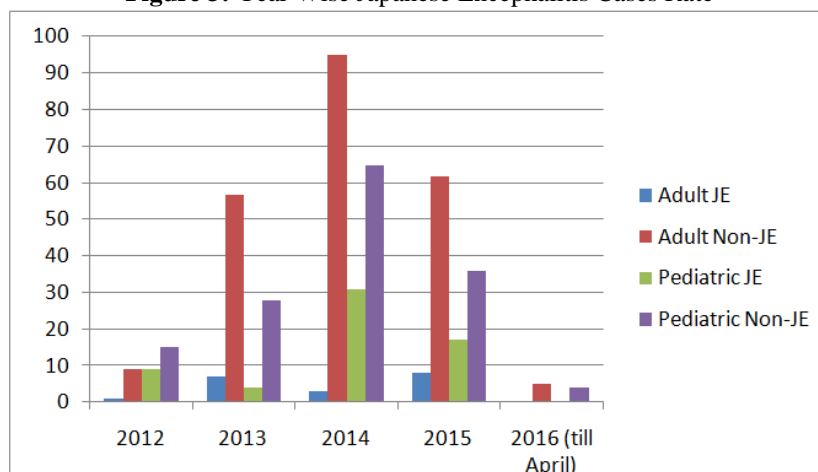
**Figure 1: Year Wise Encephalitis Case Rate**



**Figure 2: Year Wise Encephalitis Cases Death Rate**



**Figure 3: Year Wise Japanese Encephalitis Cases Rate**



#### IV. Discussion

In our study it was observed that encephalitis rate is highest in male, in both age groups which was completely opposite to the study of Benjamin P. George in 2014, they found female sex as highest hospitalized encephalitis. The study was conducted in the United States from the year 2000 to 2010<sup>[12]</sup>. Another study by Britton in 2015 informed in his study as highest risky encephalitic patient group is male children<sup>[13]</sup>. In a study of Dr. R. Kumar, reported all age group are equally in risk for encephalitis which could be reported in our study too<sup>[14]</sup>. In the same study 100% patients showed fever but in our study it was 98.57% for pediatric and 100% in

adults groups. Other symptoms were also not found exactly same with our study. Some of the studies reported encephalitis only in pediatric age group whereas in our study both pediatric and adult age groups were equally involved<sup>[15]</sup>. But severity found in pediatric age group as mortality rate was found higher in pediatrics which was proved by some other studies too<sup>[16]</sup>. Again in a study of Clare Huppatz and his associates observed decreasing trend of mortality rate in children with increasing trend in adults<sup>[17]</sup>. The study was conducted in Australia. Based on treating and diagnostic facilities availability these may change.

## V. Conclusion

It was observed that mortality rate is higher in pediatric age group but both age groups are equally in risk. To control the disease risk, etiology must be known by the treating physician for whom government must introduce the testing facilities of all probable causing agents in each locality/district. Government may also aware people to regarding transmission of all routes of encephalitis. Again vaccination of selected diseases (like JE, measles, mumps etc.) may also play an important role to control and minimize the diseases.

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