IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 22, Issue 7 Ser.11 (July. 2023), PP 45-50
www.iosrjournals.org

Electroencephalography Of Non- Epileptic History Associated Panic Disorder Patients

*Bipul Chandra Kalita[1], Pankaj Kumar[2]Dhivya S[3] Tintodana Komil Jigar[4]
[1]*Assistant Professor, Department of Physiology;[2]Tutor, Department of Biochemistry; S.M.M.H. G.M.C. Saharanpur(U.P.)* [3] *Assistant Professor, Department of Biochemistry, S.M.S.R.,Sharda University(U.P.)*
[4]*Assistant Professor,S.D.C.&H. Patan(Gujrat)*

ABSTRACT
Background: *In health care centres of north India patients having non-epileptic history are considered for major issues like panic disorder. So the study aimed to record abnormal EEG patterns of such Panic disorder patients.*
Methods: *A cross-sectional study was conducted on outdoor& indoor panic disorder patients having non-epileptic history who visited first time in the Department of Psychiatry, S.M.M.H. GMC Hospital of Saharanpur, North India within over one year. DSM-IV was applied to evaluate 13 signs & symptoms of panic disorder & EEG was recorded by Brain Tech 40+ system.*
Results: *228 primary care adults male and female were assessed. The present study reported 21.49 % abnormal EEG recordings. Non-epileptic intermittent slow delta frequency was recorded in 27 females as well as diffuse delta-theta in 15 males. 7 females reported slow waves and epileptic spikes. They had palpitations at14.9%; sweating at15.9%; trembling or shaking at 15.4%; sensation of shortness of breath or smothering at 15.8%; feeling of choking 11.4%; chest pain or pain12.3%; nausea or abdominal misery 16.7%; dizziness or lightheadedness 17.1%; derealization or depersonalization17.1%; worry of dropping control or going crazy 14.5%; fear of death 11.8%, paresthesias 16.7%; chills or warm flashes 12.7%.*
Conclusions: *Abnormal slow frequency & epileptic spike indicated 3% non-epileptic history associated panic disorder patients are vulnerable to being epileptic.*
Keywords- *panic disorder, DSM-IV, electroencephalography, epileptic spike.*

Date of Submission: 20-07-2023 Date of Acceptance: 30-07-2023

I. Introduction:

A panic attack is an intense frightening of sudden episodes of fear without danger of threat to life presented with several physical reactions. Hyperventilation-like discomfort, identity control loss, and thinking of dying, paresthesias, dizziness are the symptoms of panic disorder.[1] Their right frontal cerebral activity specifies anxiety and fear.[2] Amygdale, and its associated areas, the parts of the anterior mesh working leads to physiological or psychological predispositions of fear. The behavioral alteration was controlled by the hippocampus & associated areas the parts of the posterior neural net along with the prefrontal cortex.[3]

National Co morbidity Survey (NCS) stated female adults were risked two times higher than adult males. 18.1% prevalence was reported among 40 million panic disorder geographical inhabitants of India.[4] Previous studies supported non-specific or abnormal EEG patterns in 15-30% of Panic Disorder patients.[5,6] Such case studies also indicated patients initially diagnosed with panic attacks but later diagnosed with epilepsy.[7] Occasionally, activities such as spikes or sharp frequencies having epileptic patterns are recorded along with basic alpha or beta frequency.[8]

Desynchronization of alpha down to 7-12 hz accompanied by beta synchronization up to 13-30Hz leads to a decrease in synchronization of the thalamocortical system and enhances extrathalamic inputs through the sensory meshwork from reticular formation of the midbrain.[9]

Aims and objectives: To evaluate EEG patterns in non-epileptic history-associated panic disorder patients.

II. Material & methods:

Sample population
228 indoor and outdoor patients visited the first-time Deptt of Psychiatry, S.M.M.H. GMC Saharanpur district of Uttar Pradesh, North India.

Study design
Cross-sectional study.

Study period
June 2022 to June 2023.

Inclusion standards
Adult panic disorder patients.

Exclusion standards
Concerned with seizure & epilepsy, intellectual developmental postponement, stroke and different neurological problems, regularly take psychotropics and various drugs, alcoholism or drug abuse.

Study procedure
1. Outdoor& indoor panic disorder patients having non-epileptic history& having 13 symptoms of panic disorder were evaluated with DSM-IV.[10]
2. EEG was evaluated with Brain Tech 40+ system operated with eyes open, eyes closed, talking, sleeping, seizure and photic mode for 5 minutes each. The system was having 40 channels, 220 V +10% 50 Hz EEG, frequency band 0.1-100 Hz, and filter frequency 1 Hz to 70 Hz. The EEG patterns such as 14Hz and six Hz high-quality spikes, small sharp spikes at 6 Hz, slow waves, psychomotor variations, subclinical rhythmic electroencephalographic discharges, and wicket spikes were nonspecific.[10]
3. Patients were divided into abnormal EEG (n=49) and typical EEG (n=179) groups.
4. The study was discussed with every participant. Confidentiality of data was maintained all over the study period.
5. The institutional ethics committee, S.M.M.H. GMC, Saharanpur was issued a letter of permission for the study.

Analysis: Data were collected in an Excel sheet and analyzed with frequency, and percentage.

III. Results:

Data collected among 228 no outdoor& indoor panic disorder patients visited the first-time Deptt of Psychiatry, S.M.M.H. GMC Saharanpur district of Uttar Pradesh, North India were analyzed. The patients were having non-epileptic history & having 13 symptoms of panic disorder

In our study all subjects were from similar geographical area and having age males 29.6 ± 12.3 years, females 30.8 ± 12.8 years. N=49 patients reported abnormal EEG frequency. N=9 reported 9-10 Hz irregular with temporal intermittent δ frequency, n=9 reported 10 Hz regular with frontal intermittent δ frequency, and n=9 females reported 8-11 Hz regular with polymorphic δ frequency. N=9 males reported 10-12 Hz regular with slow θ, δ diffuse frequency, n= 6 males reported 14-18 Hz irregular basic activity along with θ, δ slow frequency diffuse at the front-parietal area(Table 1&Fig 1).

N=7 females having 10-18 Hz irregular frequency with slow and epileptic spike focus at frontal, temporal, and parietal locations(Table 1&Fig 2).

21.49% patients reported abnormal EEG frequency. Researchers evaluated sign & symptoms including palpitations at14.9%; sweating at15.9%; trembling or shaking at 15.4%; sensation of shortness of breath or smothering at 15.8%; feeling of choking 11.4%; chest pain or pain12.3%; nausea or abdominal misery 16.7%; dizziness or lightheadedness 17.1%; derealization or depersonalization17.1%; worry of dropping control or going crazy 14.5%; fear of death 11.8%, paresthesias 16.7%; chills or warm flashes 12.7%(Table 2).

Table 1: Presentation of basic activity and abnormal electroencephalography.

Sex differentiation (n=49)	Basic activity	Abnormal findings	Focal cortical area	Result
Female(n=9)	9-10 hz irregular	Temporal intermittent frequency (δ)	Temporal area	Non-epileptic
*Female(n=9)	10 hz regular	Frontal intermittent frequency (δ)	Frontal area	Non-epileptic
*Female(n=7)	10-18 hz iregular	Slow (θ, δ) frequency and spike	Frontal,parietal, temporal	Epileptic may be interictal type
Female(n=9)	8-11 hz regular	Polymorphic (δ) frequency	Temporal and parietal area	Non-epileptic
Male(n=9)	10-12 hz regular	Slow frequency (θ, δ)	Diffuse whole brain	Non-epileptic
Male(n=6)	14-18 hz iregular	Slow frequency (θ, δ)	Diffuse fronto-parietal	Non-epileptic

*epileptic spike and non-epileptic slow wave and (n=7), *non-epileptic frontal intermittent frequency(n=9);n=number of subjects

Table 2: Percentages (%) of signs & symptoms included in EEG specific subdivision of patients.

DSM-IV classified signs & symptoms	Typical EEG of n=179 no of patients(Male=93, Female:86)	Abnormal EEG of n=49 no of patients(Male=15,Female=34)
1.palpitations	45 (19.7%)	34(14.9%)
2.sweating	56 (24.6%)	36 (15.8%)
3.trembling or shaking	67(29.4%)	35(15.4%)
4.sensations of shortness of breath	34(14.9%)	36 (15.8%)
5.feeling of choking	50 (21.9%)	26(11.4%)
6.chest pain or pain	39 (17.1%)	28 (12.3%)
7.nausea or abdominal misery	37(16.2%)	38(16.7%)
8.dizziness or lightheadedness	44(19.3%)	39(17.1%)
9.derealization or depersonalization	26(11.4%)	33(14.5%)
10.worry of dropping control or going crazy	59 (25.9%)	26(11.4%)
11.fear of death	39(17.1%)	27(11.8%)
12.paresthesias	48(21%)	38(16.7%)
13.chills or warm flashes	27(11.8%)	29(12.7%)

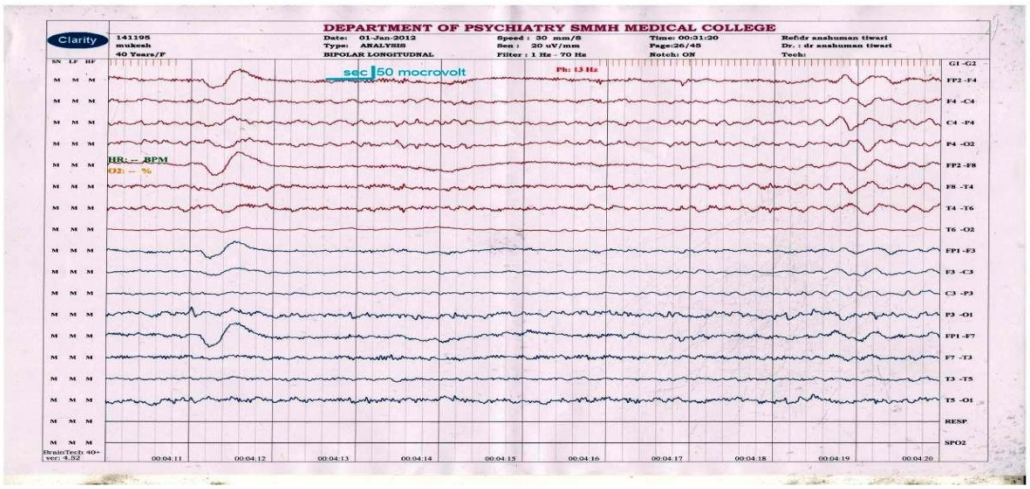

Figure 1:Non-epileptic slow δ type frontal intermittent frequency (hz) of n=9 panic disorder female.

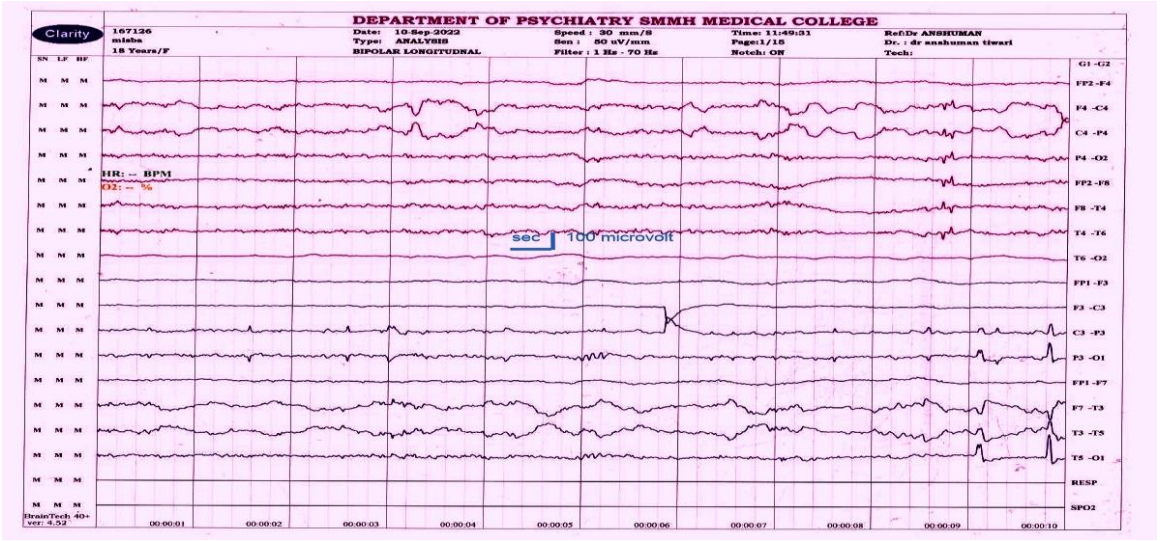

Fig 2: Epileptic spike & slow θ, δ frequency (Hz) of n=7 panic disorder female.

IV. Discussion:

The study reported 21.44% abnormal EEG patterns than 20% by Hayashi et al. Our study participants were n=228 compared with n= 70. The study reported non-epileptic slow wave along with an epileptic spike in n= 7 females compared to epileptic paroxysmal & spike in n=2 females. Non-epileptic temporal, frontal & polymorphic intermittent δ frequency in n=27 females &n= 10 males with non-epileptic diffused slow θ, δ in n=15 males was compared with n=11.[11]

Present study patients having non- epileptic history, the rate of Interictal Epileptiform Discharges (IED)s detection is 3% and concomitant with So EL.[12] Although panic disorder patients with IEDs have improved the hazard of acute seizures, the risk for subsequent unprovoked seizures or epilepsy is unknown and requires assessment on an individual level. EEG evidence with the non-epileptic slow wave and epileptic spike is shown along with Sharma, R 2010 (Fig 3) described evidence of the epileptic burden of temporal lobe seizure.[13] It is unclear to differentiate whether the epileptic or seizure episode is a psychological non-epileptic or pathological brain lesion in sub-cortical areas or the deep brain showing delta or theta frequency. Intermittent delta action is also associated with extra temporal epileptic activity with frequency 0.1-3Hz& 50-100 microvolt amplitude.[14]

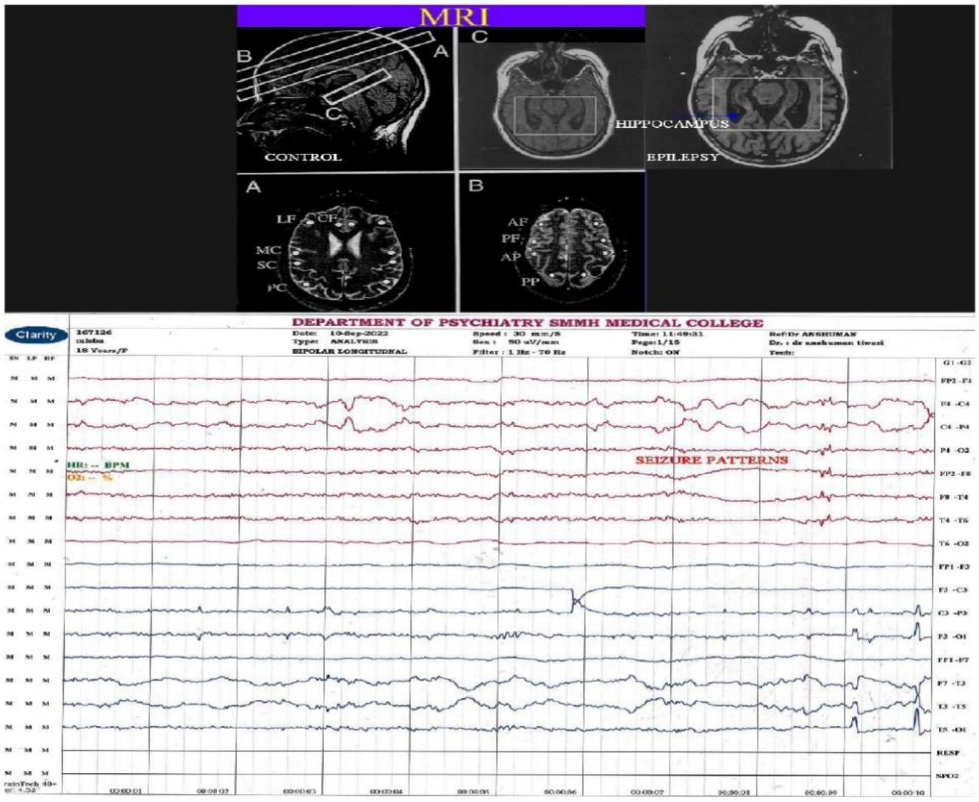

Fig 3.(The top panel) Epileptic impairment of hippocampus. The hippocampus region showing T1&T2 weighted images in MRI for comparison of hippocampus area in epilepsy(shown in panel on right in first arrow by Sharma R 2010). (The bottom panel)Present study EEG was presented with slow wave and spike in temporal as well as in fronto- parietal cortices.

During the resting state of panic disorder patients alpha 2 desynchronization i.e. non-specific information processing results attention and alertness on the frontal and temporal side to be correlated with autonomic sympathetic activity i.e. heart rate increasing, R-R interval shortening, HRV-slowing, nausea or abdominal distress, derealization and paresthesias resulted due to sympathetic activity.[11,15] Oscillation of theta (3-7Hz) and beta(13-26 Hz) in the central& frontal region was reported in panic disorder patients. Slow EEG i.e. the theta frequency is negatively correlated with resting activity-related brain functions. As well as reduced delta & increased beta is having a positive correlation with increased attention & alertness in temporal & parietal sub cortical regions.[16]

Limitations:

Research participants were from similar geographical inhabitants. The study fails to draw a relationship between individual signs and symptoms mentioned of panic disorder patients and each abnormal EEG pattern.

V. Conclusion:

Abnormal non-epileptic slow EEG, both intermittent and burst-type frequency is being observed in 21.49% as well as epileptic spike in 3% patients. Patients having panic disorder with non-epileptic history are associated with seizure episodes or epileptic activity.

Competing interests: no
Source of support: nil

References:

[1]. Aroniadou-Anderjaska V, Fritsch B, Qashu F, Braga MF. PathologyAnd Pathophysiology Of The Amygdala In Epileptogenesis And Epilepsy. Epilepsy Res. 2008 ;78(2-3):102-16
[2]. Lai CH. Fear Network Model In Panic Disorder: The Past And The Future. Psychiatry Investig. 2019;16(1):16-26
[3]. Ressler KJ. Amygdala Activity, Fear, And Anxiety: Modulation By Stress. Biol Psychiatry. 2010;67(12):1117-9
[4]. Mclean CP, Asnaani A, Litz BT, Hofmann SG. Gender Differences In Anxiety Disorders: Prevalence, Course Of Illness, Comorbidity And Burden Of Illness. J Psychiatr Res. 2011;45(8):1027-35
[5]. Carvalho MR, Velasques BB, Cagy M, Marques JB, Teixeira S, Nardi AE, Piedade R, Ribeiro P. Electroencephalographic Findings In Panic Disorder. Trends Psychiatry Psychother. 2013 ;35(4):238-51

[6]. Wise V, Mcfarlane AC, Clark CR, Battersby M. An Integrative Assessment Of Brain And Body Function 'At Rest' In Panic Disorder: A Combined Quantitative EEG/Autonomic Function Study. Int J Psychophysiol. 2011 ;79(2):155-65
[7]. Thompson SA, Duncan JS, Smith SJ. Partial Seizures Presenting As Panic Attacks. BMJ. 2000;21;321(7267):1002-3
[8]. Emmady PD, Anilkumar AC. EEG Abnormal Waveforms. [Updated 2023 May 1]. In: Statpearls . Treasure Island (FL): Statpearls Publishing; 2023
[9]. Johari K, Behroozmand R. Event-Related Desynchronization Of Alpha And Beta Band Neural Oscillations Predicts Speech And Limb Motor Timing Deficits In Normal Aging. Behav Brain Res. 2020 ; 393:112763
[10]. Electroencephalographic Changes Of Panic Disorder Patients In West Uttar Pradesh. Tiwari A, Garg G, Rathi P, &Kalita BC. International Journal Of Health Sciences. 2022;6(S6): 10703–10715
[11]. Hayashi K, Makino M, Hashizume M, Nakano K, Tsuboi K. Electroencephalogram Abnormalities In Panic Disorder Patients: A Study Of Symptom Characteristics And Pathology. Biopsychosoc Med. 2010 ;4:9
[12]. So EL. Interictal Epileptiform Discharges In Persons Without A History Of Seizures: What Do They Mean? J Clin Neurophysiol. 2010;27(4):229-38
[13]. Sharma R. MRI And MRSI Application In Neurodegeneration. Nat Prec (2010)
[14]. Andraus ME, Alves-Leon SV. Non-Epileptiform EEG Abnormalities: An Overview. Arq Neuropsiquiatr. 2011 ;69(5):829-35
[15]. Wilkinson DJ, Thompson JM, Lambert GW, Jennings GL, Schwarz RG, Jefferys D, Turner AG, Esler MD. Sympathetic Activity In Patients With Panic Disorder At Rest, Under Laboratory Mental Stress, And During Panic Attacks. Arch Gen Psychiatry. 1998 ;55(6):511-20
[16]. Englbregt HJ, Keeser B, Promos VHL,Verhanger-Schouten S,Deijen JB.In-Vivo EEG Changes During A Panic Attack In A Patient With Specific Phobia.Journal Of Medical Cases.2012;3 (1): 34-38