Neurofeedback (Live Z score And sloreta Guided) For Migraine – Case Study

Chetna Punia [a*]

ARTICLE INFO

RECEIVED 26th March, 2023

REVIEWED 4th April, 2023

ACCEPTED 7th April, 2023

** Corresponding author.*

Email: *chetna.punia@gmail.com*

Patient Detail:

- Sex: M/F Female
- Age: 44
- Ethnicity: Indian

Symptoms:

Left side pain head (sometimes radiating to left arm) pain more acute over temporal and frontal areas.
Associated nausea (occasionally),
Body pain,
Anxiety and
Tiredness
Mood issues (irritable, lack of motivation)

Diagnosis:

Migraine pain reported with a frequency of twice a week. There is history of 25 years of migraine.

Treatment:

Reported efficacy of neurofeedback therapy in migraine attacks in literature.
Diaphragmatic breathing, Biofeedback training (Hear rate coherence, GSR) and Brainwave entrainment employed. Diet changes based on Hair Mineral Analysis Test suggested (Ca/Mg ratio was found deviant from normal), Client was also suggested to eat high protein, short and frequent meals based on the metabolism profile.

Protocol: QEEG guided protocol to train deviant Z- Scores towards Z=0

Rationale: Following (one or many BA areas could be found deviant in this case) [L= Left, R= Right]

Anxiety Network **BA** (L, R) 4, 6, 7, 10, 13, 21, Amygdala
Pain Network **BA** (L, R) 1, 2, 3, 4, 5, 13, 24, 32, and33
Migraine Network **BA** (L, R) 13, 39, 40, 41, and 43
Low motivation **BA** (L, R) 10, 11, 13, 24, 25, and 33
Depression (Sad & Blue) **BA** (L, R) 8, 9, 24, 25, 32, and 33
Mood swings **BA** (L, R) 10, 11, 45, and 46

Decision to train BAs to be done by observing two things:

1. Which areas show up to be deviant in QEEG
2. Which areas correspond to the presenting symptoms

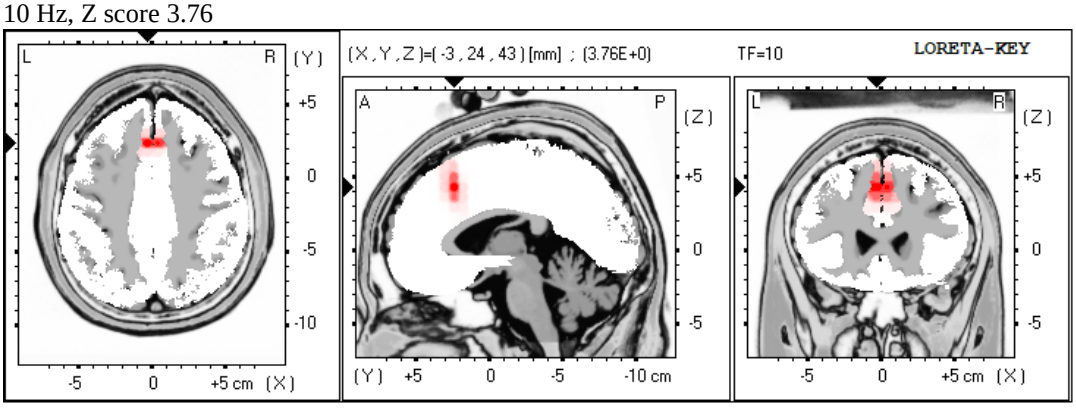
In the following SLORETA images these BA were found with deviant Z-scores at different times of therapy and were trained towards optimal Z score. These areas also correspond to areas of anxiety, migraine, and pain networks.

BA 6 (R), 7, 13, 21 (L), 32, 39 (R), 41 (R)

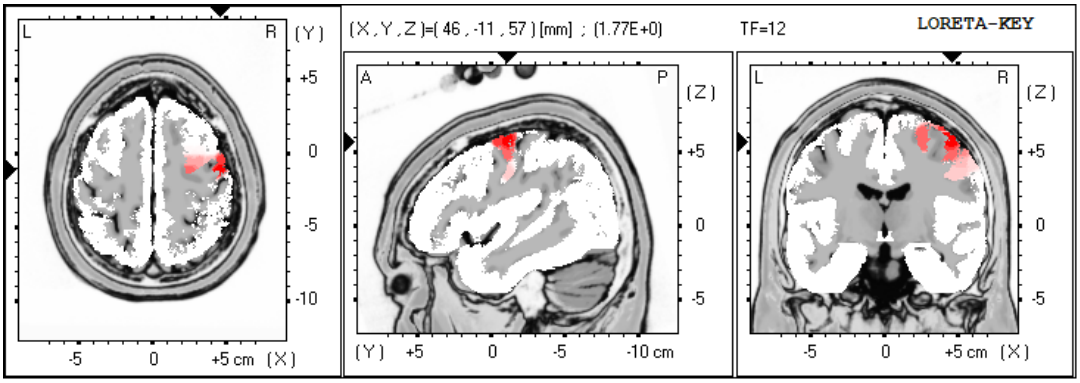
OBSERVATIONS

A. Observations from First QEEG LORETA ZSCORE deviant in BA 32, 6

Brodmann area 32
Cingulate Gyrus
Limbic Lobe
10 Hz, Z score 3.76

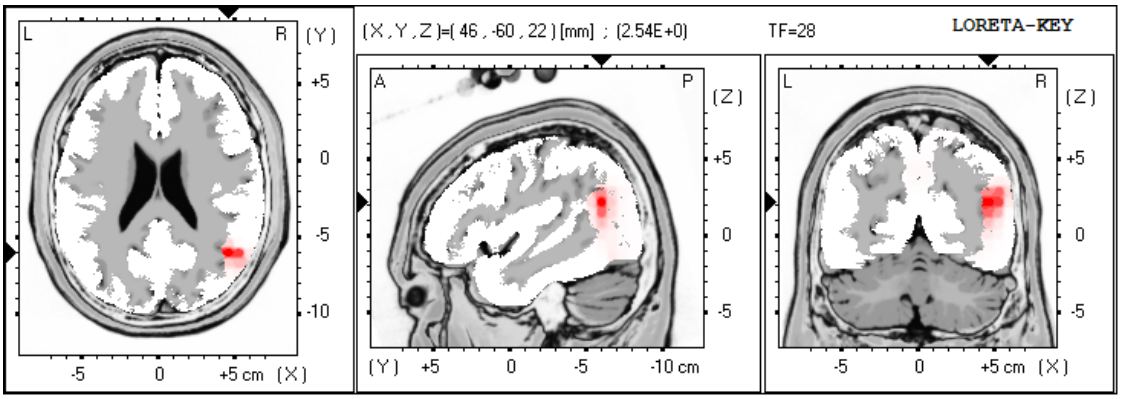


Brodmann area 6
Precentral Gyrus
Frontal Lobe
12 Hz Z score 1.77

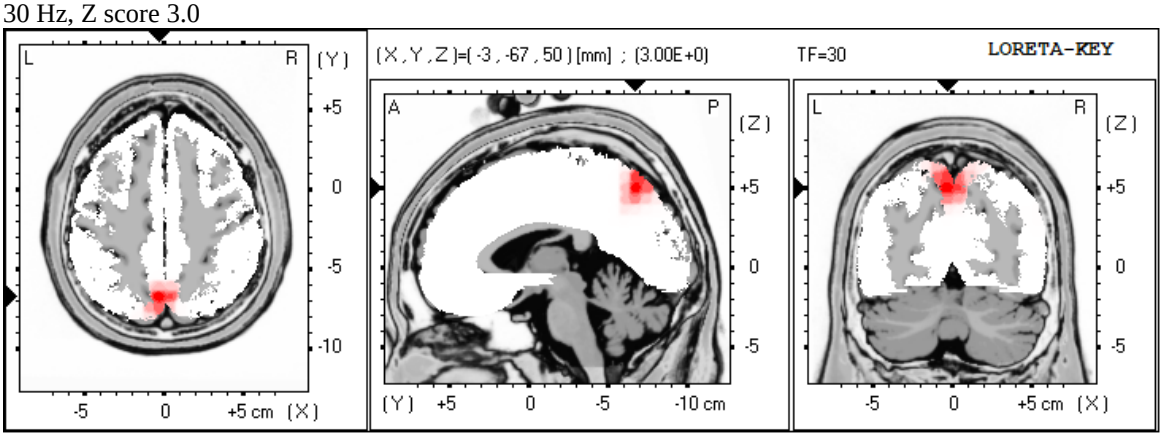


B. QEEG findings After 7 Session of Neurofeedback

Brodmann area 39
Middle Temporal Gyrus
Temporal Lobe
28 Hz, Z score 2.54

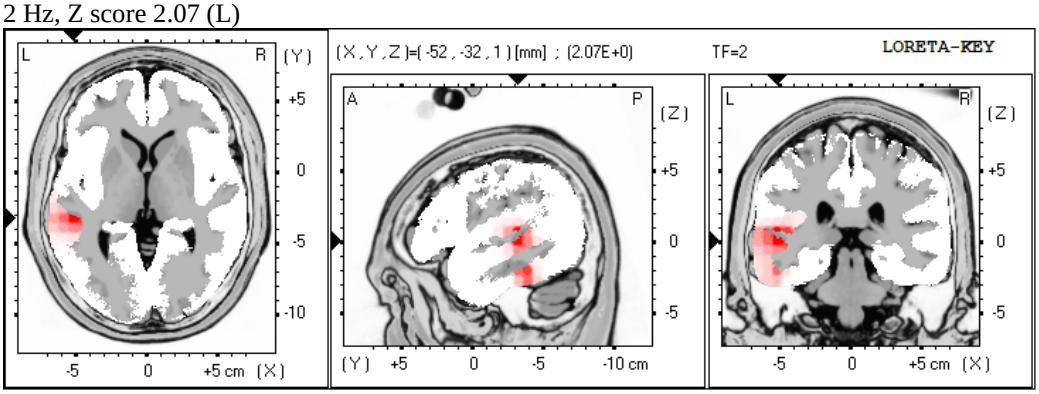


Brodmann area 7
Precuneus
Parietal Lobe
30 Hz, Z score 3.0

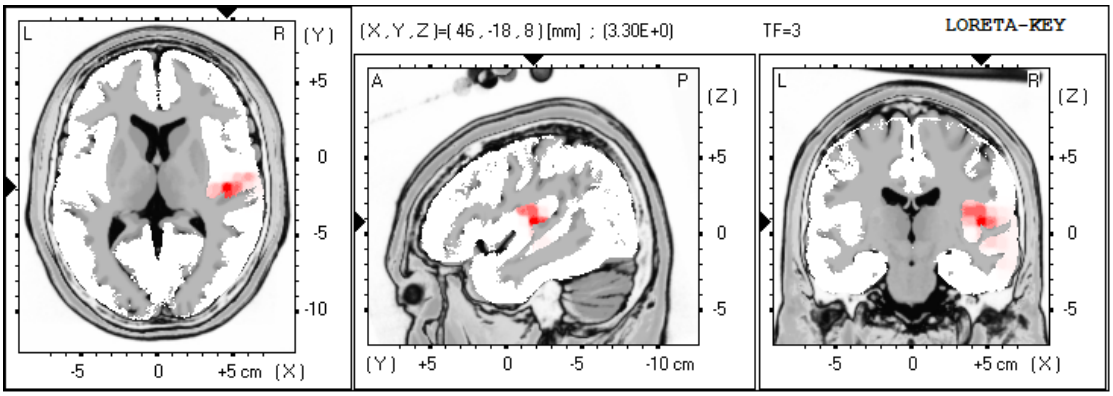


C. QEEG findings After 15 Sessions

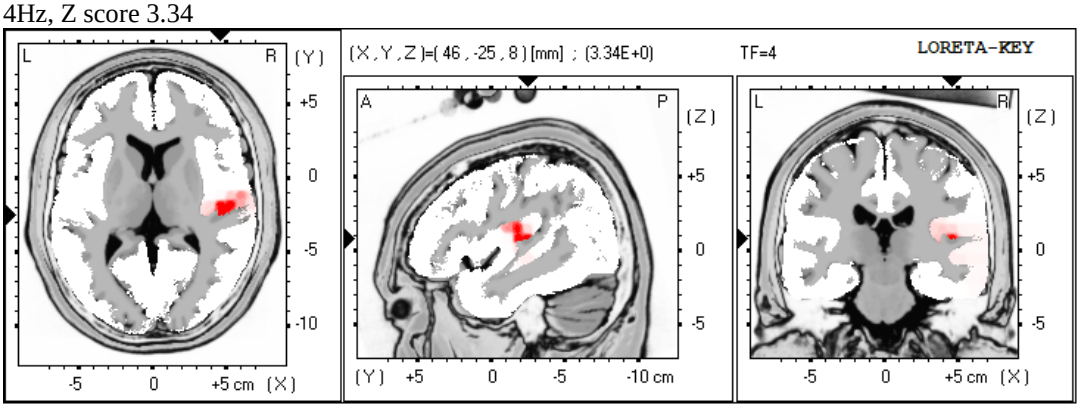
Brodmann area 21
Middle Temporal Gyrus
2 Hz, Z score 2.07 (L)



Brodmann area 13
Superior Temporal Gyrus
Temporal Lobe
3 Hz, Z score 3.29

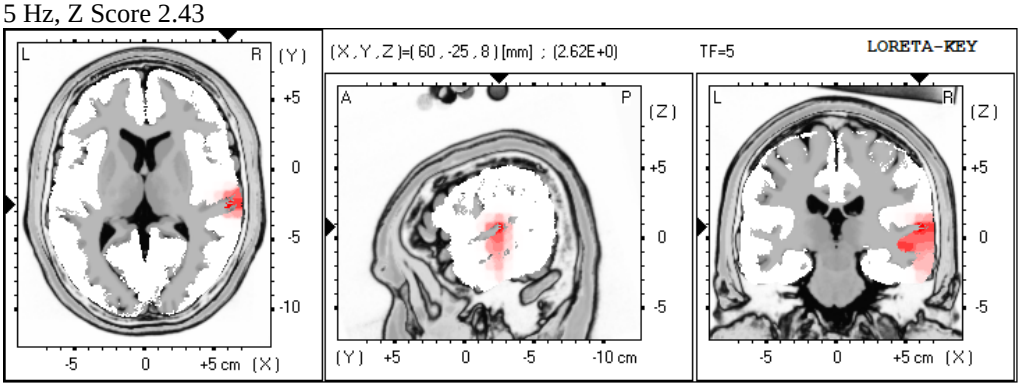


Brodmann area 41
Superior Temporal Gyrus
Temporal Lobe
4Hz, Z score 3.34

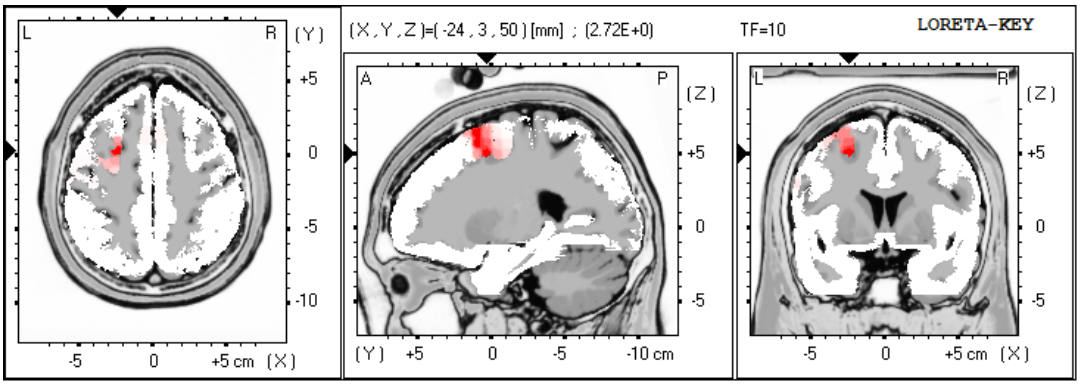


D. Results after 30 Sessions

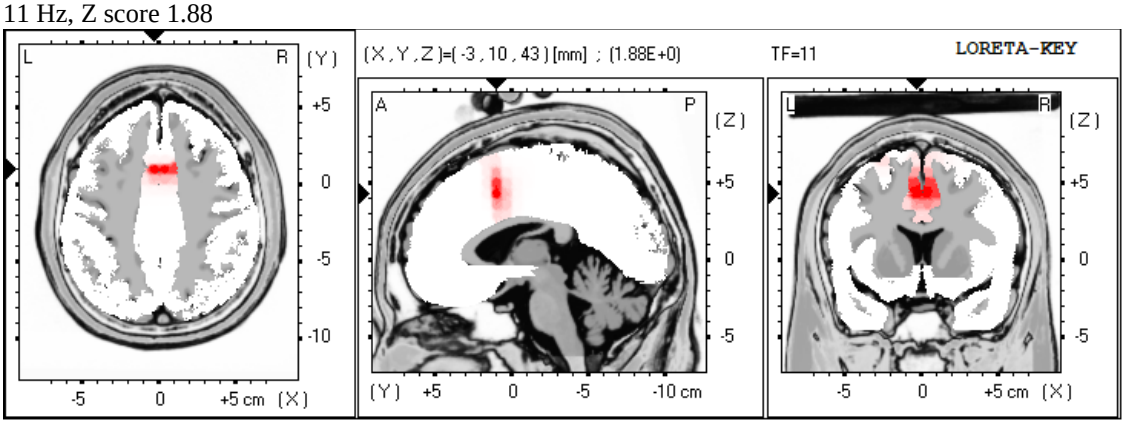
Brodmann area 41 (second best match)
Superior Temporal Gyrus
Temporal Lobe
5 Hz, Z Score 2.43



Brodmann area 6
Middle Frontal Gyrus
Frontal Lobe
10 Hz, Z score 2.72



Brodmann area 32
Cingulate Gyrus
Limbic Lobe
11 Hz, Z score 1.88



Results: We see there is improvement in BA 32 (from Z=2.72 to Z score 1.88); BA 6 (Z score increased from 1.77 to 2.72). BA 41 (Z score improved to Z= 2.43 from Z= 3.34).
Z score for BA 7, 13, 21, 39 improved to normal ranges.
Sessions were stopped at this point as client reported no migraine for more than 3 months.

Follow-Up:

Five year follow-up from client: Verbal account.

Reported no more migraine pains since the neurofeedback treatment, much more energy to do daily activities and devote energy in pursuing hobbies (gardening). Yoga and walks are part of lifestyle now. Client is also regularly doing HRV home training for past six months now which helps in relaxing.

Reference (if any-- optional):

Walker JE. QEEG-Guided Neurofeedback for Recurrent Migraine Headaches. *Clinical EEG and Neuroscience*. 2011;42(1):59-61. doi:10.1177/155005941104200112

Stokes, D.A., Lappin, M.S. Neurofeedback and biofeedback with 37 migraineurs: a clinical outcome study. *Behav Brain Funct* **6**, 9 (2010). https://doi.org/10.1186/1744-9081-6-9