An Insight into Demographic, Treatment and Genetic Trends in Epilepsy Cases Enrolled in a Tertiary Care Hospital of Karachi

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ABSTRACT

Introduction: Epilepsy is one of the predominant neurological disorders globally with the prevalence rate of 9.99/1,000 individuals in Pakistan. It has the ability to affect people of all ages and genders equally. Several factors can be responsible for the origin of epilepsy which include, environmental and genetics or interaction of both. Data regarding epilepsy in Pakistan is limited from all aspects including demographic and clinical evaluations and genetic analyses as well.

Objective: To get insights into different factors which can be held accountable to influence the manifestation of epilepsy.

Methodology: To conduct this study, ethical approvals were taken from the institutes involved. A total of 180 subjects (80 cases and 100 controls) were enrolled and their blood was drawn for genotyping, after taking their consents. Demographic and clinical data was also taken from both groups. DNA was extracted through salting-out method for genetic analysis. Genotyping of Single Nucleotide Polymorphism (SNP) rs2279020 which is located at the alpha subunit of Gamma-Aminobutyric Acid (GABA) receptor was conducted through Tetra Primer-ARMS- PCR technique. All the obtained data was analyzed through IBM SPSS Statistics (V20.0) and MedCalc software.

Results: In the current study the number of female cases (73.75%) were found to be higher than male cases (26.25%). Parental consanguinity and positive family history of epilepsy was observed in 56.25% and 22.5% cases respectively. Mean age at onset of seizures was observed to be 13.3 ±1.14 years. A considerable number of cases (38.75%) were the residents of different industrial areas of the city. Monotherapy was observed to be the preferred treatment given to a significant number of cases (66.25%) as compared to polytherapy (26.25%). Furthermore, Carbamazepine was found to be the most commonly prescribed Anti-Epileptic Drug (AED) (31.25%) followed by Sodium Valproate and Levetiracetam (26.25% and 8.75%) respectively. The most common drug combination given to cases was Carbamazepine with either Clonazepam or Levetiracetam. The genotypic analysis revealed that rs2279020 was not associated with the susceptibility to epilepsy in the targeted population of this study ($\chi^2 = 0.900$, $p = 0.638$; Odds Ratio = 1.06, $p = 0.841$). However, when the data was analyzed on the basis of gender within groups the variant (GG) genotype was observed to be present in a significantly higher number of female cases as compared to male cases or female controls ($\chi^2 = 6.092$, $p = 0.048$). This study provides a baseline data of epilepsy and its possible risk factors in Pakistani population. The observed risk factors of this study can be analyzed extensively in future. Moreover, the relationship of the AEDs can also be investigated with different SNPs of GABA receptors as these SNPs have the tendency to influence the treatment outcomes.

Conclusions: Varied factors which include female gender, positive family history, consanguineous marriages and GG genotype of rs2279020 might have played role in increased susceptibility to epilepsy in the targeted population of this study. These findings may contribute some substantial information in the pool

of limited data regarding epilepsy in Pakistan. Further studies are required to get better understanding of the mechanisms of the risk factors reported herein and their involvement in pathogenesis of epilepsy.

REFERENCES

1. Fisher, R. S., Acevedo, C., Arzimanoglou, A., Bogacz, A., Cross, J. H., Elger, C. E., ... Hesdorffer, D. C. (2014). ILAE official report: a practical clinical definition of epilepsy. Epilepsia, 55(4), 475-482.
2. Grigoriadis, D. E., Hoare, S. R., Lechner, S. M., Slee, D. H., & Williams, J. A. (2009). Drugability of extracellular targets: discovery of small molecule drugs targeting allosteric, functional, and subunit-selective sites on GPCRs and ion channels. Neuropsychopharmacology, 34(1), 106-125.
3. National Centre for Biotechnology Information. rs2279020. Retrieved Dec 22, 2021 from https://www.ncbi.nlm.nih.gov/snp/rs2279020
4. World Health Organization. (2010). Epilepsy in the WHO Eastern Mediterranean region: bridging the gap. Available from https://apps.who.int/iris/handle/10665/119905.
5. World Health Organization. (2019). Epilepsy. Retrieved Dec 22, 2021 from https://www.who.int/news-room/fact-sheets/detail/epilepsy