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Research Article

### CASUAL COMPARATIVE ANALYSIS OF GINGIVAL INDEX SCORE AMONG EPILEPTIC PATIENTS USING CARBAMAZEPINE, SODIUM VALPROATE AND PHENYTOIN

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**Abstract:**

**Objective:** This research hoped to compare the periodontal health of epileptic patients using three different anti-epilepsy drugs, namely, carbamazepine, phenytoin and sodium valproate using the gingival index score.

**Methodology:** This casual comparative analysis of periodontal health was conducted at Liaquat University Hospital from January to March (2017) upon 3 groups of patients, each using a different anti-epileptic drug. The groups comprised of 15 patients each and the groups were matched for age, sex and duration of drug therapy. All recordings made on the gingival index score on each patient were carried out by two independent observers and neither of the observers knew what anti-epilepsy therapy the patients were taking. The observers had tools (other than the gingival index score and visual comparison chart) such as mouth mirror and periodontal probe at their disposal. Informed (written) consent was taken from the subjects and the data collected was analyzed using SPSS v. 21.0 and MS Excel 2016.

It was ensured through rigorous questioning that the patients had each been using anti-epilepsy drug monotherapy i.e. the patients had been using only one of the aforementioned drugs. This ensured the validity and reliability of the results.

**Result:** Differences were observed in periodontal health of patients using the different anti-epilepsy drugs. Patients using sodium valproate monotherapy had the highest gingival index scores that correspond to poorer periodontal health and gingival condition. The duration of therapy was directly proportional to the higher gingival index score.

**Conclusion:** Anti-Epilepsy drugs namely, carbamazepine, sodium valproate and phenytoin have marked ill-effects on periodontal health, as is revealed by the gingival index score. The magnitude damage that each drug causes differs and is higher than the reported literature norms of healthy individuals. Patients on sodium valproate monotherapy had the highest gingival index score followed closely by patients using phenytoin monotherapy. Carbamazepine was by far the safest of the three, with lowest gingival index score.

**Key Words:** Epilepsy, Carbamazepine, Phenytoin, Sodium Valproate, Anti-Epilepsy Drugs, Anti-Convulsion Drugs, Periodontal Health and Gingival Index.

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**INTRODUCTION:**

Epilepsy, a commonly encountered and life-long, neurologic disorder, affects nearly one to three percent of the world population, and an approximate ten percent of the world population is likely to encounter a seizure or multiple seizures during the course of their lives[1]. Epilepsy is a general term covering a wide variety of common neurological syndromes, differentiated by multiple factors, including (but not limited to) age of manifestation, heredity, type of seizures, abnormalities of E.E.G (electroencephalogram), and probability of recovery and cure[2]. Since, in today's world, emphasis is no longer limited only to treatment but also to achieve better quality of life, regardless of whether this is achieved by seizure suppression or only by reducing the ill-effects of treatment therapy[3].

Oral health of an individual is prone to being affected, both, by the condition (epilepsy) itself and the drugs used to treat the said condition. If the patients' well-being is a priority (along with treatment) and oral ill-health is to be prevented, a careful oral health management plan needs to be specifically devised for patients suffering from epilepsy. There are multiple obstacles on the path towards this goal, one being the fact that a large part of the total epileptic patient population comprises of children, more often than not, younger than 15 years. In addition to that, a significant portion of the aforementioned child segment is faced with motor and mental deficits [4,5]. Such individuals, more than anyone else, are at a danger of experiencing poor oral health due to their rather limited ability self-care, the ill-effects of the anti-epilepsy medication: specially, carbamazepine, sodium valproate and phenytoin which are widely linked with poor periodontal health [6,7].

Epileptic patients (regardless of whether or not they are using medication) are plagued with poor oral health. Significant differences have been documented between the patients and similar age matched control groups of the normal/healthy population [8]. Published evidence, however, offers limited information on the effects of anti-epileptic medication on oral health and no simultaneous comparisons have ever been drawn between the three

common drugs (carbamazepine, sodium valproate and phenytoin).

Owing to the fact that epilepsy is a problem that is encountered often in clinical practice, health care professionals should aspire to be well-versed with the different expressions of the neurological ailment, the different types of anti-epilepsy drugs, and their probable adverse effects. We believe that the results that this research yields will help construct guidelines for treatment planning and recommendations for managing the oral health of such patients.

**METHODOLOGY:**

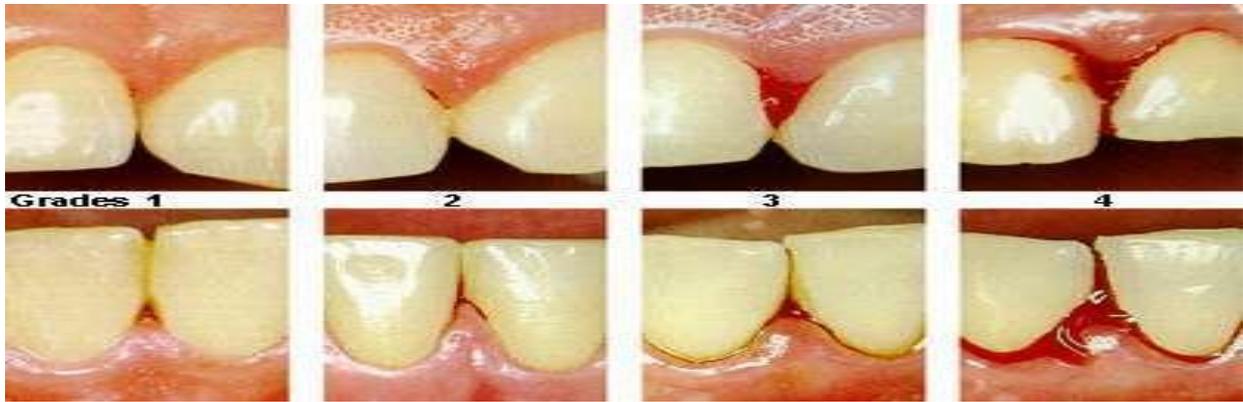
This casual comparative analysis of periodontal health was conducted at Liaquat University Hospital from January to March (2017) upon 3 groups of patients, each using a different anti-epileptic drug. The groups comprised of 15 patients each and the groups were matched for age, sex and duration of drug therapy. All recordings made on the gingival index score on each patient were carried out by two independent observers and neither of the observers knew what anti-epilepsy therapy the patients were taking. The observers had tools (other than the gingival index score and visual comparison chart) such as mouth mirror and periodontal probe at their disposal. Informed (written) consent was taken from the subjects and the data collected was analyzed using SPSS v. 21.0 and MS. Excel 2016.

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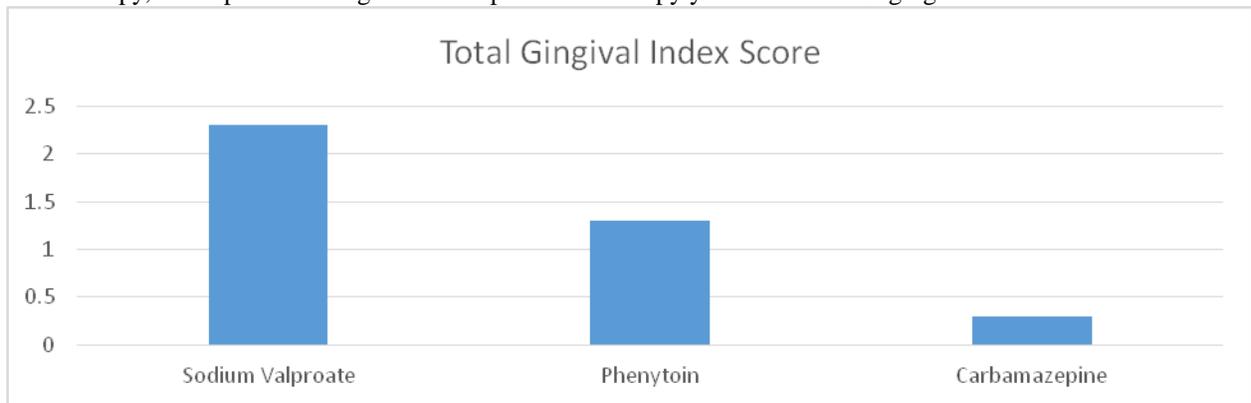
**RESULTS:**

Differences were observed in periodontal health of patients using the different anti-epilepsy drugs. Patients using sodium valproate monotherapy had the highest gingival index scores that correspond to poorer periodontal health and gingival condition. The table below helps understand the Gingival Index Score and is followed by picture of the progressively worsening states of periodontal health.

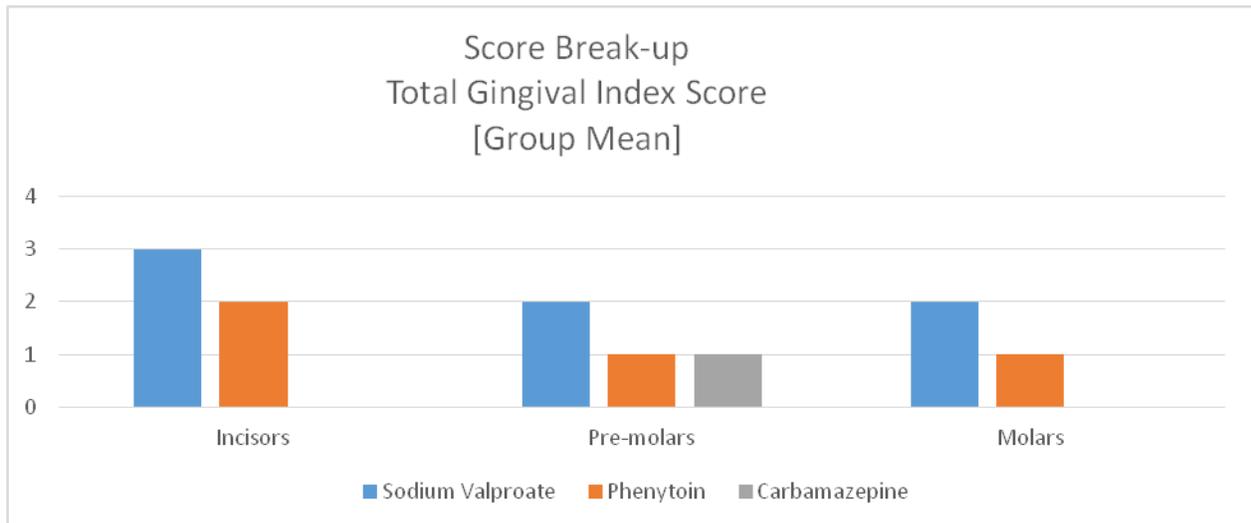
Appearance	Bleeding	Inflammation	Points
Normal	No bleeding	None	0
Slight change in color & mild edema with slight change in texture	No bleeding	Mild	1
Redness, Hypertrophy, Edema and Glazing	Bleeding on probing/pressure	Moderate	2
Marked redness, Hypertrophy, Edema, Ulceration	Spontaneous bleeding	Severe	3



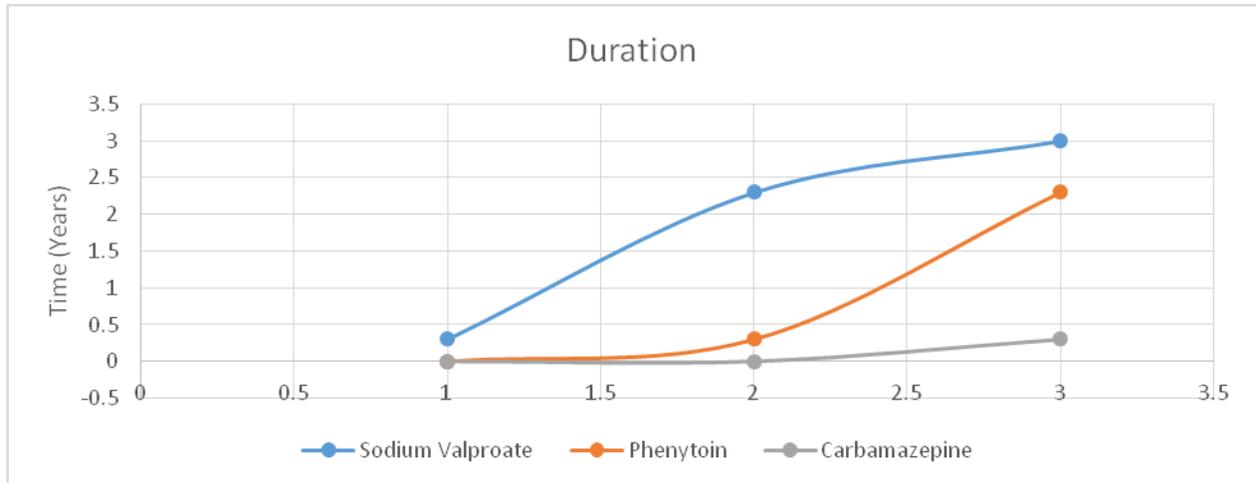
Patients using sodium valproate monotherapy yielded the higher gingival index scores than patients using phenytoin monotherapy, while patients using carbamazepine monotherapy yielded the lowest gingival index scores.



The score break-up is as follows.



The duration of therapy was directly proportional to the higher gingival index score.



### DISCUSSION:

It is observed that patients with epilepsy suffer from a myriad of oral health problems. [9-10] and most of our results are consistent with published evidence [11-12]. Our study also revealed that nearly all our subjects had high gingival index scores than normal control levels obtained from literature [13].

A very significant finding of our research was probably the fact that most marked gingival enlargement was observed in individuals using mono-therapy of sodium valproate and the justification can be found in pre-existing literature. [14] However, what sets our research results apart is that the periodontal effects of sodium valproate use were compared to two of the other anti-epilepsy monotherapy drugs (phenytoin and carbamazepine).

Tan et al., reports that sodium valproate is linked to gingival tissue damage in epilepsy patients by clearly identified mechanism and it is also noted that lack of oral hygiene or the presence of inflammation cannot cause such severe damage [15]. Those findings too are consistent with the present results. This may be due to the fact that sodium valproate can cause direct bone marrow suppression and bring the platelet count and clotting factors down to an almost clinically deficient level. It can thus increase the incidence of gingival bleeding. It is also noticed that sodium valproate impairs wound healing (owing to its effect of bone marrow suppression) and periodontal damage due to secondary reasons tends to heal slowly and often ulcerate [14]. This too earns sodium valproate a higher score than its counterparts on the gingival index.

The disease course of Phenytoin-induced periodontal damage is still not well known but several

mechanisms, all related to an interaction between phenytoin and the gingival fibroblast, have been put forth. Seymour revealed that the most crucial factor leading to phenytoin-induced periodontal damage was poor maintenance of oral hygiene [16] and our results too suggest that the ability of phenytoin alone, in the absence of oral hygiene neglect, to cause gingival bleeding (a factor that ascertains high index score) is rather lower than that of sodium valproate.

There is a lot of debate about the potential periodontal damage that phenytoin can incur especially gingival hyperplasia but not all individuals assigned phenytoin monotherapy develop gingival hyperplasia. Published incidences vary from nil to almost eighty five percent [17]. This immense difference in the range of gingival hyperplasia development variation may be due to the absence of unanimous criteria for assessing gingival hyperplasia, the probable impact of difference in duration of therapy, dosage regimen and age of the patients. However, most researcher studies claim the incidence of having encountered gingival hyperplasia in patients using phenytoin monotherapy to be almost forty to fifty percent [18-20].

The results show that carbamazepine was by far the safest anti-epileptic drug from a periodontal point of view since the group of patients undergoing carbamazepine monotherapy seemed to have the least number of periodontal issues. International literature too suggests that individuals on active medication (anti-epileptic drugs other than carbamazepine) showed a significantly greater gingival index scores and plaque index score. Close examination using mouth mirrors and periodontal probes further reveals carbamazepine users have significantly lower probing

depths than the sodium valproate and phenytoin-treated subjects [21].

The only drawback of our study was that we could not account for the discrepancies in the result that may be due to the fact most of the individuals in our sample did not pay much attention to their oral health and seldom followed regular oral hygiene protocols. This can be attributed to the fact that most were even ignorant towards the said hygiene protocols. Other researchers, in the past, namely Jovanovic´ and Gajic´ too have been troubled with such attitude of research subjects[22]. Moreover, regular long-term syrup-based medications that may contain sugar, may also be a contributory factor of the periodontal impairments.

### CONCLUSION:

Anti-Epilepsy drugs namely, carbamazepine, sodium valproate and phenytoin have marked ill-effects on periodontal health, as is revealed by the gingival index score. The magnitude damage that each drug causes differs and is higher than the reported literature norms of healthy individuals. Patients on sodium valproate monotherapy had the highest gingival index score followed closely by patients using phenytoin monotherapy. Carbamazepine was by far the safest of the three, with lowest gingival index score.

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