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Prevalence of Post-traumatic epilepsy in epilepsy patients referred to Sayad Shirazi Hospital in Gorgan from 2018 to 2021

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Abstract

Background: Traumatic brain injury (TBI) is a significant medical concern, with post-traumatic epilepsy (PTE) being one of its consequences. Epilepsy, with a global prevalence of 1%, is the third most common neurological disorder after stroke and Alzheimer's disease. Trauma accounts for 20% of symptomatic epilepsy cases. Understanding the prevalence of PTE and the factors influencing it can aid in diagnosis and treatment. This study aims to investigate the relationship between epilepsy prevalence, age, gender, and post-traumatic brain injuries.

Methods: This retrospective descriptive study analyzed data from 135 epilepsy patients hospitalized between 2018 and 2021. Statistical analysis involved reviewing relevant data and creating tables and graphs.

Results: The findings indicate that epilepsy is more prevalent in men than in women, with the most affected age group being 20-29 years old. Post-traumatic epilepsy emerged as the most common factor among the patients. The prevalence of PTE in this study was 9.6%, closely aligning with the global rate of 7.8%.

Conclusion: The prevalence of post-traumatic epilepsy is significantly influenced by geographical conditions and living environments. In developing countries, the high volume of road traffic and increased accident rates contribute to a higher incidence of post-traumatic epilepsy.

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Highlights

What is current knowledge?

Epilepsy can significantly limit a patient's activities, and its treatment is often prolonged. Understanding the prevalence of the disease in specific communities and identifying contributing factors can aid in managing and potentially mitigating the disease. This study aims to provide insights into these aspects.

What is new here?

1. The prevalence of post-traumatic epilepsy in this study (9.6%) closely aligns with global statistics (7.8%).
2. In developing countries, the high volume of road transport and more significant usage increases the likelihood of accidents and, consequently, the incidence of epilepsy following accidents.

Introduction

A seizure is a sudden event characterized by the spread of a pathological electrical pattern in the brain cortex, leading to uncontrollable activities. This can result in altered levels of consciousness, behavior, memory, and sensory perception (1). While the cause of many seizures remains unknown and may involve a genetic predisposition, others result from concomitant diseases or brain injuries (2). Such injuries include brain trauma, stroke, viral infections, inflammation, and febrile seizures during childhood or later in life, all of which increase the likelihood of developing epilepsy (3,4).

Traumatic brain injury (TBI) is a joint presentation in emergency departments and is closely associated with seizures (5). Significant risk factors for seizures following TBI include brain contusions with subdural hematoma, skull fractures, prolonged loss of consciousness or amnesia, and being 65 years of age or older (6). Epidemiological data indicates that women are more likely than men to experience seizures after head trauma, with a ratio of 3 to 1, making women the majority of post-traumatic seizure patients (7).

Iran faces a substantial number of road accidents, resulting in numerous cases of concussions and associated injuries. For accident victims, particularly those with multiple health issues, experiencing seizures compounds their problems (8). This study aims to determine the prevalence of post-traumatic epilepsy (PTE) among epilepsy patients referred to Sayad Shirazi Hospital in Gorgan between 2018 and 2021.

Methods

This descriptive cross-sectional study examined patients diagnosed with epilepsy who were referred to Sayad Shirazi Hospital in Gorgan between 2018 and 2021. All patients diagnosed with epilepsy during this period were evaluated. The sample size was determined, resulting in the inclusion of 135 patients in the study. The study assessed the prevalence of epilepsy and its relationship with gender and age. Additionally, it determined the percentage of epileptic patients who developed epilepsy following an accident. Statistical analysis was conducted using SPSS version 16.

Results

According to Table 1 and Figure 1, Among the 135 examined patients, 57% are men and 43% are women. The most affected age group was 20-29 years old, which includes 23.7% of patients.

Table 1. Frequency of epilepsy based on the relative frequency of different age groups

Age (Year)	Male cases	Female cases	Total frequency (Year)	Total relative frequency (Percent)
10-19	6	5	11	8.140
20-29	19	13	32	23.70
30-39	15	14	29	21.48
40-49	14	7	21	15.56
50-59	8	10	18	13.34
60-69	6	3	9	6.660
70-79	5	1	6	4.440
80-89	3	6	9	6.660
Total	77	58	135	100

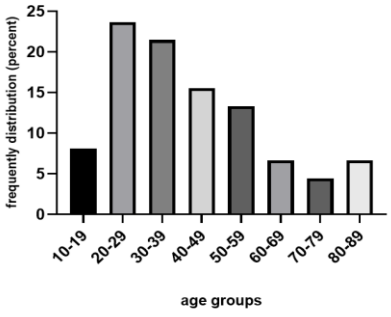

Figure 1. Frequency distribution chart according to age groups

Among the 135 patients who were examined, 13 patients had post-traumatic epilepsy. Upon further investigation into these cases, it was found that among these, 9 cases were due to accidents, 3 cases were due to falling from a height, and only 1 case was due to a fight. Notably, severe CNS damage has been reported in accidents and falls from heights. In Table 2, these 13 items are given clearly.

Table 2. Cases of post-traumatic epilepsy

Case	Gender	Age (Year)	Cause	Severity of injury
1	male	24	accident	severe
2	male	37	accident	severe
3	male	66	accident	severe
4	male	34	accident	severe
5	male	83	accident	severe
6	male	36	accident	severe
7	male	24	accident	severe
8	male	52	accident	severe
9	female	37	accident	severe
10	male	24	falling	severe
11	male	29	falling	severe
12	female	36	falling	severe
13	male	39	fight	average

Table 3 shows the breakdown of post-traumatic epilepsy cases by gender and age. The cases of falling from a height in men have all occurred in the age group of 20-29 years, while for women, it was in the age group of 30-39 years. The history of these patients is not mentioned, and it seems that the leading cause of epilepsy is the same accident mentioned.

Table 3. Relative frequency of post-traumatic epilepsy cases

Cause of post-traumatic seizures	Number of males	Number of females	Total frequency (Year)	Total relative frequency (Percent)
Accident	8	1	9	69,23
Falling	2	1	3	23.08
Fight	1	-	1	7.69
Total	11	2	13	100

Discussion

Epilepsy is a significant neurological disorder resulting from disruptions in nerve signal transmission between brain cells (1). It affects individuals across all age groups. Etiologically, 50.6% of epilepsy cases have an identifiable underlying cause, including trauma (21.9%), stroke (7.6%), infectious diseases (5.7%), brain tumors (5.3%), and other factors (10.1%) (4). Trauma, including head injuries and complications from neurosurgery, is a leading cause of epilepsy.

Different studies report varying prevalence rates of epilepsy worldwide. Generally, the frequency of epilepsy is significantly higher in underdeveloped countries compared to developed and developing nations. The global incidence of epilepsy in developed countries is 6 to 7 cases per 10,000 people, while in developing countries, it is 49 cases per 10,000 people (6). In Iran, the number of people with epilepsy exceeds the global average, with approximately 700,000 individuals affected. According to a 2021 national survey published in Nature, the prevalence of epilepsy in Iran is 16.6 per 1,000 people, with an average age of onset between 19-21 years (7). This study included all age groups, but in the current study conducted at Sayad Shirazi Hospital in Gorgan, the age group most affected was 20-29 years, indicating consistency between the studies and confirming that young adults are predominantly affected by epilepsy.

Other studies have shown that the prevalence of epilepsy increases with age, with significant rises at ages 5-9 years and over 80 years (9). The current study focused on patients at Sayad Shirazi Hospital, an educational and therapeutic center. A limitation of this study is the absence of children who are treated at Taleghani Children's Hospital in Gorgan. Consequently, the age group most affected by this study was 20-29 years (32 out of 135 patients). In all age groups, except for those aged 80-89 years, epilepsy prevalence was higher in men. In this study, 9.6% of patients (13 individuals) developed epilepsy after an accident, with causes including traffic accidents (9 patients), falls (3 patients), and a fight (1 patient).

A 2020 study by Hausted Siig Hanna et al. examined the frequency of post-traumatic epilepsy in Denmark between 2004-2016, involving 1010 patients, with 56% being men and 44% women. This study also found a higher prevalence of epilepsy in men, consistent with our findings. In Hausted Siig Hanna's study, 19% of patients had post-traumatic epilepsy, compared to 9.6% in the present study (6). Both studies indicated that severe CNS damage is more common after accidents, with 63.8% of patients in Hausted Siig Hanna's study and 92% in the present study experiencing severe CNS damage. The primary causes of epilepsy after accidents in both studies were traffic accidents, followed by falls and fights.

A 2021 study by Yu Tingting and colleagues investigated the clinical features of post-traumatic epilepsy, finding the average age of epilepsy onset to be 21.4 years. In contrast, the current study found an average age of 41.9 years (10). Despite this difference, both studies identified the third decade of life as the peak period for epilepsy onset. Yu's study reported a 1.3% rate of post-traumatic epilepsy (10), while rates were 7.7% in Blumenfeld et al.'s study, 19% in Hausted Siig Hanna's study, and 9.6% in the present study (2,6). These variations suggest that geographical and environmental factors significantly influence post-traumatic epilepsy rates.

The current study and Blumenfeld's study reported post-traumatic epilepsy rates of 9.6% and 7.7%, respectively (2). However, Yu's study in Beijing reported a rate of 1.3%, significantly lower than global averages (10). This indicates that the prevalence of post-traumatic epilepsy is closely linked to geographical conditions and living environments. In developing countries, higher volumes of road traffic and increased motor vehicle use raise the risk of accidents and subsequent epilepsy. Occupational factors also contribute, with men having a higher risk of developing post-traumatic epilepsy than women.

In conclusion, this study shows that the prevalence of seizures, epilepsy, and post-traumatic epilepsy in Iran aligns with global statistics. However, Yu's study demonstrates that lower post-traumatic epilepsy rates are achievable. Strategic planning at various societal levels could significantly reduce the substantial societal costs associated with epilepsy.

Conclusion

In the present study, epilepsy was found to be more prevalent in men than in women, with the most commonly affected age group being 20-29 years old. Post-traumatic epilepsy was identified as the most common factor influencing the occurrence of epilepsy. The prevalence of epilepsy following an accident was 9.6%, which is close to the global statistic of 7.8%.

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Ethical statement

This study was approved by the Ethics Committee of Golestan University of Medical Sciences with an approval code of IR.GOUMS.REC.1401.441.

Conflicts of interest

The authors declare no conflict of interest.

Author contributions

This article presents the results of Mrs. Zahra Hesam's thesis as a General Practitioner student at Golestan University of Medical Sciences. Dr. Soghra Hesam supervised the study and was the responsible investigator, while Dr. Hamid Sepehri served as an advisor for the implementation of this study.

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