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Epilepsy and risk of injury

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In their article "Risk for injuries and accidents in epilepsy: a prospective population-based cohort study," Mahler et al.[1] examine how epilepsy and its associated medical conditions are related to accidental injury. For many years, it has been known that people with epilepsy have more accidental injuries than people who do not have seizures. It might be assumed that having seizures causes events. However, the link may not be as clear and simple as it sounds. For instance, what if the reason a person had seizures was because of a past stroke? In addition to causing seizures, the stroke may have left the person with weakness. If a fall (or accident) occurred, was it due to the weakness, or did the person fall during a seizure? What if the person fell because of dizziness? Dizziness can have many different causes, only one of which is seizures.

How was the study done?

Mahler et al. wanted to better understand the relationship between seizures and accidental injuries. Mahler et al. work in Stockholm, Sweden. In Sweden, there are several medical registries: Swedish law requires the collection of medical information on its residents, both children and adults. One of these is the Stockholm Incidence Registry of Epilepsy. It is a population-based registry that includes medical information on almost 1 million urban residents in the northern parts of Stockholm. The registry began in September 2000 and ended in August 2008.

Mahler et al. were able to carefully review these medical registries in order to identify people who were newly diagnosed with epilepsy. Using the same medical registry systems, they were able to identify people who also may have had a stroke, Alzheimer disease, brain tumors, and psychiatric illnesses, to name a few medical conditions. Information was also available about the person's age, sex, and education (whether he or she had completed primary school, secondary school, or had gone to university).

In order to study a group of people with epilepsy, a comparison group is needed. Using the same database, Mahler et al. identified an identical group of people without seizures. In fact, in order to be more accurate, they matched each person with seizures to 8 other people who were similar, but did not have seizures. In this way, they was able to identify 2,130 people with epilepsy. They matched them with 16,992 people without seizures.

What did the study show?

First, it is important to understand the groups that were studied. The average age of people with epilepsy was 35, similar to the age of people without seizures, which was 39. Women accounted for 45%. When looking at people with epilepsy, they were much more likely to have a comorbid medical condition (22%) vs the group without epilepsy (5%). Within the group with seizures, two-thirds (66%) had a kind of epilepsy known as focal onset. In other words, the seizures started in a specific part of the brain (focal). This is the most common kind of epilepsy. This kind of epilepsy is often caused by a brain injury (trauma or stroke), brain tumor, prior brain infection, or an error in the formation of the brain (called cortical dysplasia).

Mahler et al. found, as had other studies, that people with epilepsy were more likely to have accidental injuries. What they also found was that if a person had epilepsy and a comorbid

medical illness, the risk of an accident was much higher. Moreover, the highest risk of accidental injuries occurred in people who had epilepsy and serious brain tumors. There was also a higher risk of accidental injuries in people with epilepsy and stroke, epilepsy and diabetes, and epilepsy and psychiatric illness. What was also interesting was the time between the diagnosis of epilepsy and the occurrence of an accident. The chance of having an accident was highest within the first 2 years after the diagnosis was made.

It is also important to know what things were not associated with an increased risk of accidental injuries. The level of a person's education did not affect the risk of injury or accidents. The risk was similar in men and women. The increased risk did not seem to be related to the type of epilepsy.

Discussion

There are many advantages to a study like this. First, because the information comes from a national registry, it incorporates a large number of people. As long as the person stays in Sweden (does not move away), the follow-up is very long. In short, a study of this kind can look at a large group of people, and evaluate how they do over a long time frame.

Although there are advantages, there are also several disadvantages. The registry did not include information about how well the person's seizures were controlled. Further, because the registry used medical coding, Mahler et al. could not assess if the accident was directly related to a seizure. The registry captured injuries and accidental injuries for which the person sought medical attention (and was therefore diagnosed and medically coded). The registry would have missed minor injuries, those for which a person would not seek a doctor's help.

This kind of information is extremely helpful to doctors who take care of people with epilepsy. All doctors are worried about the injuries that can occur due to seizures. This study showed that people with epilepsy who also have another medical illness are much more likely to have accidental injuries. This information can be useful in identifying people at risk. By putting into place measures to prevent injury, doctors can minimize accidental injuries, and hopefully reduce problems that are associated with epilepsy.

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About epilepsy

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What is a seizure?

Nerve cells talk to each other constantly. They send both electrical messages and chemical ones, which we call neurotransmitters. Sometimes, brain cells send the wrong messages. Our brains have their own autocorrect, but just like a cell phone, sometimes an error goes through. When the wrong signal is sent, other brain cells respond to the error by sending abnormal signals. If enough brain cells start sending the same wrong message, a seizure occurs.

One way to think of this is that the brain works like an orchestra. There are different sections in an orchestra, each with its own instruments. Although each instrument plays its own part, it is only when they all play together that complex music is made. While playing, each member of the orchestra has to listen to the other members. As a team, playing together and listening to one another, the best music is made. In other words, when all of the brain cells are working together, a person can think clearly and logically.

However, what if one person in the orchestra began playing a different tune? At first, no one would notice that someone was playing the wrong tune. Nearby orchestra members would become confused: which tune were they supposed to play? As more members of the orchestra began playing the different tune, it would eventually become noticeable. At some point, the different tune might become louder than the original music.

This is similar to how a seizure gets started, and keeps going. The nearby brain cells start playing the wrong tune. They encourage other brain cells to do the same thing. Eventually, 2 different tunes are being played at the same time. For an orchestra, the combined music would be confusing and might turn into noise as opposed to music. When a person has a seizure, at some point, the seizure is loud enough that he or she can no longer think clearly and logically. If this worsens, a person can no longer stay aware of what is going on. It is at this point that he or she loses consciousness.

What is epilepsy?

There are many kinds of seizures. There are many kinds of epilepsy. Using a combination of medical tests in combination with a detailed medical history and examination, a doctor can narrow down the list of possibilities to arrive at the correct epilepsy diagnosis. Epilepsy is diagnosed in a person who has had 2 or more unprovoked seizures in his or her lifetime.

How is epilepsy diagnosed?

The doctor will need to know as much as possible about what happened immediately before, during, and after the seizure. How often do the seizures occur? Is there a warning sign? Does the person remember anything about the seizure? All of these questions help the doctor to better understand the kind of seizures and the kind of epilepsy that the person is experiencing. In addition, asking someone who has seen the person's seizures to describe them can provide valuable information. For instance, if the person who had the seizure cannot remember their seizures, the observer may be able to provide information that the patient may not know.

Medical testing can also help to better understand a person's seizures. EEG is a simple and painless study that records the brain's electrical activity. The brain waves are picked up by tiny electrodes that are applied to the to the person's scalp. The EEG is reviewed, looking for specific brain wave patterns that happen during or between seizures in patients with epilepsy. These patterns provide critical information about the person's epilepsy, and help with the diagnosis.

Imaging studies are critical in understanding the cause of a person's seizures. The 2 most common studies are MRI and CT. Modern CT and MRI provide very detailed pictures of the brain, and are critical in locating tumors, scars, or other abnormalities that may cause seizures.

How are seizures treated?

There are many treatments for seizures. Medicines are tried first. If these do not work, a doctor may consider special diets, brain surgery, or devices for the treatment of seizures. The physician tries to stop all seizures while causing no side effects. It is important to tell the doctor about problems experienced while on a medication (or any treatment). Together, the patient and doctor will make the best choice of treatments.

Additional resources

Neurology Now®
journals.lww.com/neurologynow/Pages/Resource-Central.aspx

Epilepsy Foundation
epilepsy.com

Citizens United for Research in Epilepsy
CUREepilepsy.org

Reference

1. Mahler B, Carlsson S, Andersson T, Tomson T. Risk for injuries and accidents in epilepsy: a prospective population-based cohort study. Neurology 2018;90: e779–e789.

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