

# A review on natural therapy for seizure disorders

## Abstract

Anti-seizure drugs are mainly used to treat epilepsy, but have been associated with certain side effects. Apart from drug therapy, other treatment options such as herbs, vitamins, biofeedback and acupuncture are available. However, these options are not widely used because the mechanism of such therapies is not fully understood. In the recent past, there has been an increasing interest among the public and scientist to explore the herbal treatments. Therefore, this review discusses the current status of natural therapies namely ketogenic diet, self-control method, acupuncture and chiropractic. The challenges and scope of applying these therapies as treatments for seizure disorders are further highlighted. Hence, this review provides a comparison of the current natural therapies, but particularly focuses on meditation and acupuncture for patients interested in such treatment options.

**Keywords:** epilepsy, conventional therapy, natural therapy, herbal treatments, self control methods

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Qian Ying Tan, Uday P Kundap, Yatinesh Kumari, Mohd Farooq Shaikh

Jeffrey Cheah School of Medicine and Health Sciences, Monash University, Malaysia

**Correspondence:** Mohd Farooq Shaikh, Jeffrey Cheah School of Medicine and Health Sciences, Monash University, Malaysia, Tel +60142832410, Email farooq.shaikh@monash.edu

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**Abbreviations:** WHO, world health organisation; VNS, vagus nerve stimulation; DBS, deep brain stimulation; CAM, complementary and alternative medicine; EEG, electroencephalogram; Rcts, randomized controlled trials; AEDs, anti-epileptic drugs

## Introduction

World Health Organisation (WHO) defined epilepsy as a chronic disorder categorized by recurring seizures with seizures being a brief lapse of attention or muscle jerks, to severe and prolonged convulsions. The seizures are triggered by excessive electrical discharges in the neurons that are often unexpected and brief. Epilepsy is the most common chronic brain disorder globally with approximately 50million people worldwide being affected and nearly 80% occurring in developing countries.<sup>1</sup> Scientists believe that the 4 main causes of epilepsy are brain infection, head injury, brain tumour and stroke. However, epilepsy remains a puzzle as up to 60% of epileptic patients have unknown aetiology.<sup>2</sup> Signs and symptoms of seizures varies and is dependent on the area of the brain that has been affected and how far the affected area spans. Some of the temporary symptoms include loss of awareness or consciousness, disturbances of movement, sensation such as vision, hearing and taste, mood, or other cognitive functions.<sup>2</sup> According to WHO, it is possible to diagnose and treat most epilepsy patients at the preliminary stages without having to use sophisticated medical equipment.<sup>1</sup>

Anticonvulsant drugs are the conventional treatment used in epileptic patients. These antiseizure drugs often control and reduce the frequency of seizures but not really cure them completely. Studies have showed that a number of dietary modifications, nutritional supplements, and hormones are beneficial for some patients with epilepsy.<sup>3</sup> The long term use of herbs introduced in traditional medicines confirms their value in drug discovery. Historical evidences showed that herbal therapies were used to treat convulsive seizures for centuries. Herbal medicine has always played a significant role in Iranian, Indian, Egypt & Chines culture and civilization. Thousands ofyears of history and hundreds of books have placed by each traditional medicine among the oldest and richest alternative medicines. Ethnopharmacological research proved that medicinal plants have immense potential as anticonvulsant drugs and have been confirmed by scientific studies in experimental and clinical studies.<sup>4</sup>

## Conventional therapy

Before diving directly into natural therapy, some aspects of conventional therapy are first discussed to understand the current treatment options available for people with epilepsy. Figure 1 shows the possible conventional treatment options available for epilepsy.

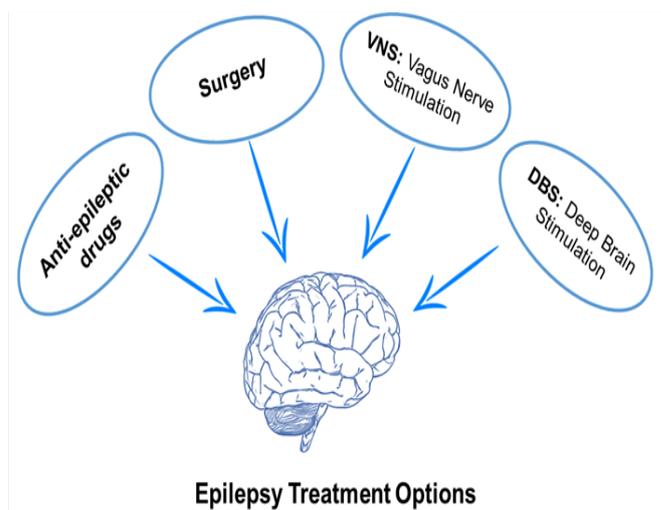


Figure 1 Conventional epilepsy treatment options.

## Anti-epileptic drugs

Anti-epileptic drugs (AEDs) discovery nearly doubled since the 1980s and are the key form of treatment option for epileptic patients.<sup>5,6</sup> There are more than two dazone of AEDs used for the therapy and some of them are effective against a specific type of epilepsy.<sup>7</sup> If the seizures are not controlled with a single AED, a combination of AEDs (polytherapy) is normally taken.<sup>8</sup> Some AEDs added to first line AED are called second line AEDs.<sup>9</sup> However, although AEDs prove to be the main treatment regime for epileptic patients, approximately 30% of epilepsy patients remain unresponsive towards drug treatment and continue to experience seizures whilst being on AEDs.<sup>10,11</sup> One of the major issue with AEDs are chemophobia associated with them. Memory impairment, cognitive dysfunction, attention, problem

solving ability, performance or visuomotor tasks; are greatly affected with barbiturates, hydantoins and carbamazepine.

## Surgery

Surgery has been used for more than a century, with a dramatic increase of usage in the 1980s and 90s, reflecting its effectiveness as an alternative to seizure medicine.<sup>12</sup> Epilepsy surgery is restricted to focal or localised type only. Some patients have showed improvement in memory and mood after surgery.<sup>13</sup> A systematic review which included MEDLINE and Cochrane database found 55 articles, which includes two randomized clinical trials on 118 patients with temporal lobe epilepsy. A higher success rate of 58-70% was observed and patients found greater freedom from seizures.<sup>14</sup> Complications associated with this type of surgery are memory problems, partial loss of sight, depression and other mood problems.<sup>15</sup> However, post-operative outcomes are dependent on age of onset and prolonged duration of epilepsy or acute post-operative seizures.<sup>16</sup> While the seizure outcomes are comparable to younger cohorts the cognitive risks of temporal lobe epilepsy surgery are greater for older patients, particularly those undergoing left temporal lobe resections.<sup>17</sup> A Cochrane review further states that more diffused brain abnormalities associated with trauma to the brain or developmental abnormalities were not associated with a good outcome.<sup>18</sup>

## Vagus nerve stimulation and deep brain stimulation

When AEDs and surgery is not the choice of therapy, neuro-stimulation may provide an alternative treatment. Vagus nerve stimulation (VNS) therapy involves stimulation of the left vagus nerve in the neck using a stimulator which sends mild electrical stimulations to the nerve that, in turn, send stimulations to the brain. These stimulations help to calm down the irregular electrical brain activity which generate electrical storm in the brain i.e., seizures.<sup>19</sup> Usually, a device is implanted in the body which provide regular stimulations. Adverse effects coupled with implantation and stimulation generally include hoarseness, cough, dyspnea, pain, paresthesia, nausea and headache.<sup>20</sup> A similar technique is deep brain stimulation (DBS) therapy essentially aims to reduce seizures frequency in epileptic patients. In DBS therapy, electrodes are implanted into the specific brain areas and then stimulated with small regular electrical impulses.<sup>21</sup> Adverse effects of some DBS include depression, subjective memory impairment, and possibly anxiety and confusion.<sup>22</sup> It has been 25 years since the first VNS implantation in humans, yet researchers still have yet to fully comprehend the effects of neuro-stimulations on cognitive functioning.<sup>23</sup>

## Natural therapy

Upon understanding the adverse effects and limitations surrounding conventional therapy, exploration of natural therapy is beneficial to aid in informed decision making when deciding on treatment options. Figure 2 illustrates the various natural therapies available for epileptic patients.

## Complementary and alternative medical therapies (CAM/Herbs)

Substances from natural origin like plant, animal and minerals etc. have provided a continuing source of medicines since ancient times, and their use has been perpetuated for centuries in traditional medicine.<sup>24</sup> Complementary and alternative medicine (CAM) has been used since a long time in various parts of the world and Western countries has gained interest over the last decades. In Western countries, natural products are used mainly to enhance general

health and to prevent seizures. In some countries where they have a well developed traditional medical systems like traditional Chinese Medicine and Ayurveda, are depend on these options for treating epilepsy. A huge a lot of research all around the world is ongoing to decipher the scientific basis and mechanisms involved. Both preclinical and clinical studies are taken up for the development of CAM in epilepsy.<sup>25,26</sup>

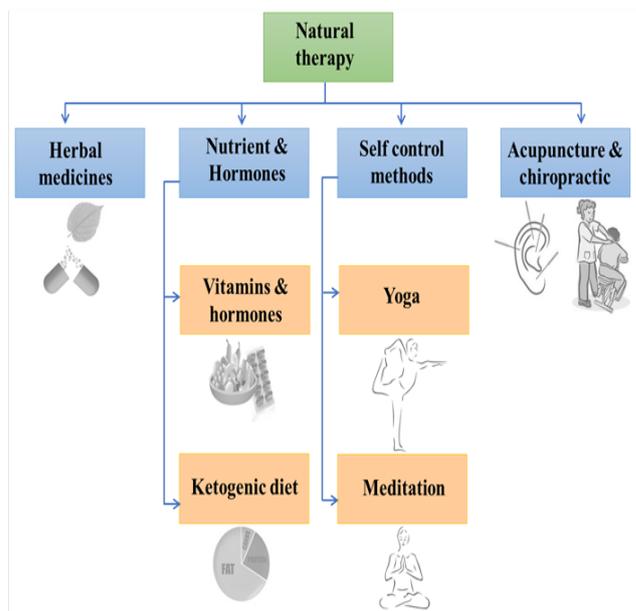


Figure 2 Natural epilepsy treatment options.

## Nutrient and hormones

Nutritional therapy has been extensively studied and is seen as one of the more economical and promising options to treat epilepsy.<sup>27</sup> Nutritional therapy includes vitamins, minerals, amino acids, hormones, herbs and ketogenic diets. Cochrane systematic reviews on nutritional therapy are limited but one concludes that there is no convincing evidence of vitamins improving seizure control or preventing side effects for people with epilepsy.<sup>28</sup> According to Cochrane systematic reviews, there is also no current evidence sufficiently supporting the use of traditional Chinese herbs as treatment for epilepsy.<sup>29</sup> However, Ketogenic diet has had substantial backing from the Cochrane database and is said to improve seizure control.<sup>30</sup> The lack of clinical trials implores for more comprehensive studies to be carried out to provide evidence for nutritional therapy options such as vitamins, minerals and hormones to study their beneficial effects on epileptic patients.

## Self-control methods

**Meditation:** Meditation has been practiced over centuries and is one of the most popular relaxation techniques. Some believe that transcendental meditation can be used as a form of epileptic treatment because the reduction of stress meant reduced incidence of seizures.<sup>31</sup> One study specifically on epileptic patients has found that meditation reduced the frequency and severity of epileptic seizures.<sup>32</sup> However, meditation has also been reported to be potentially dangerous for people with epilepsy.<sup>31</sup> The practice of meditation is said to produce hormonal changes mimicking those of the inhibitory neurotransmitter c-aminobutyric acid (GABA). It has been hypothesized that meditation increases brain GABA by causing muscle relaxation, reducing insulin secretion, ketogenesis and subsequent ketosis-enhanced entry of glutamate (the amino acid substrate of GABA) into

synaptosomes.<sup>33</sup> This allows for more glutamate to be converted to GABA. Such inhibitory neurotransmission induced by meditation might thus underlie suggested antiepileptic effects.<sup>33</sup> However, according to Jaseja, meditation may predispose individuals to epilepsy because of the increase in synchrony, glutamate and serotonin levels during meditation.<sup>34</sup> Glutamate and serotonin are implicated in epileptogenesis as they are neuro-excitatory and may yield unfavourable outcomes when in high amounts as seen during meditation.<sup>34</sup> Hence, it is essential to be well informed of the potential risks and benefits of relaxation techniques for people with epilepsy.<sup>31</sup>

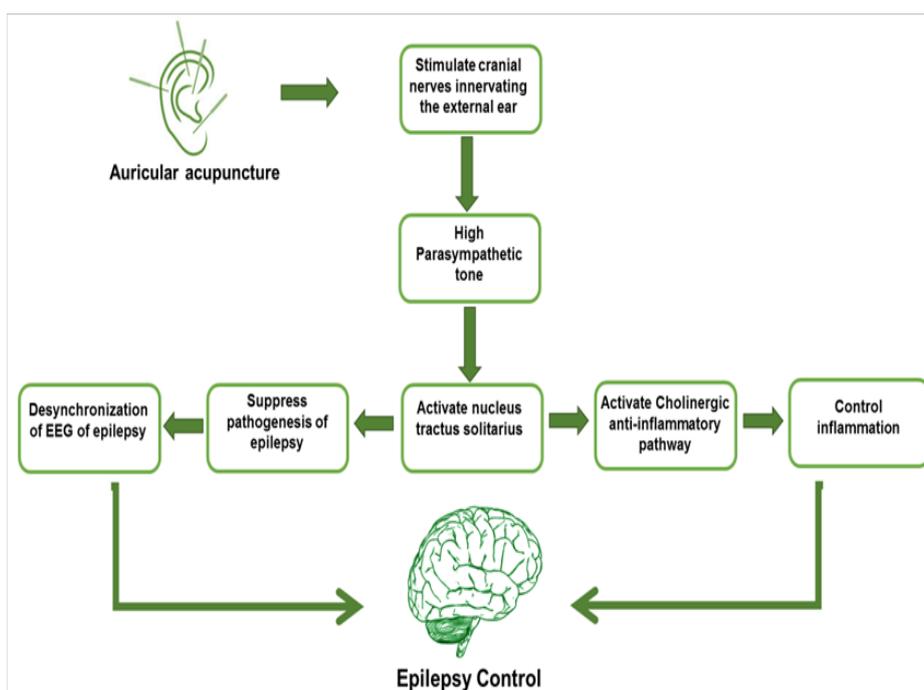
**Yoga:** Yoga is another common relaxation technique that is said to induce relaxation and stress reduction. This influences the electroencephalogram and the autonomic nervous system, thus controlling seizures.<sup>35</sup> Hence, the reduction in stress, increased PNS activity and increased brain GABA levels associated with yoga-based interventions is said to be beneficial.<sup>36</sup> It is said that yoga decreases seizure index and increase quality of life of epileptic patients.<sup>37</sup> A Cochrane review showed evidence that supports this notion. It included two trials in a sample of 50 people, with 18 who undertook yoga and 32 took AEDs served as control. Results revealed no statistically significant differences between the two groups.<sup>35,37</sup> Furthermore, the evidence indicates that beneficial outcomes is limited and of low quality.<sup>35</sup> Hence, no reliable conclusions can be drawn concerning the efficacy of yoga as a treatment for uncontrolled epilepsy due to the limited number of studies, limited participants randomized to yoga, lack of blinding and limited data on quality-of-life outcome.<sup>35</sup> Yoga would be an attractive therapeutic option for epilepsy if proved effective and so further high-quality research is needed to fully evaluate the efficacy of yoga for epilepsy. In one study, the practice of yoga, a simple form of meditation, reduced seizures and EEG changes in people with epilepsy. The effect of meditation was attributed to a reduction in the level of stress as evidenced by changes in skin resistance and levels of blood lactate and urinary vanillylmandelic acid.

**Neurofeedback:** Neurofeedback is another alternative treatments in self control method in which researchers have started to supplement

medical regimens with behavioral treatments. It is a form of biofeedback therapy based on self-modulation of the electroencephalogram (EEG) by the subject. In neurofeedback, a specific EEG frequencies is believed to influence seizure control as well as behavioral parameters.<sup>38</sup> The value of neurofeedback for human epilepsy was first established by Sterman and his colleagues in 1974. Sterman reviewed all of the literature up to 2000 and found that most of the studies on neurofeedback in epilepsy depicted positive outcome. In his meta-analysis, 82% of patients demonstrated more than 30-50% reduction in seizures. Approximately 5% remained seizure free for up to a year. In recent years, Walker and colleagues, have applied a different approach to normalize the EEG of a person with epilepsy by using qEEG as a guide for neurofeedback training in clinical settings.<sup>39</sup> The general approach is to determine the abnormalities which are obvious and significant. Then, efforts are made to train those areas in order to normalize them. This training exhibited substantial seizure reductions but not in termination of seizures. Downtraining of gamma activity over the spike focus is an effective method of preventing seizure activity with neurofeedback systems.<sup>40</sup>

### Acupuncture and chiropractic

Acupuncture for the treatment of epilepsy dates back many years and is currently on the rise among epileptic patients with some reporting a reduction in seizure frequency as a result.<sup>41</sup> Figure 3 illustrates the possible mechanism of auricular acupuncture for the treatment of epilepsy. According to Cheuk and Wong in a Cochrane review that included 17 randomized controlled trials (RCTs) with 1538 participants of many ages who were suffering mainly from generalized epilepsy, acupuncture was said to possess no adverse effects towards epileptic patients.<sup>42</sup> However, the included trials were small, heterogeneous and had a high risk of bias. It remains uncertain whether acupuncture is effective and safe for treating people with epilepsy. Hence, current evidence does not support acupuncture as a form of epilepsy treatment.<sup>42</sup> In addition to that, another higher quality Norwegian trial documented no beneficial outcomes from acupuncture, with no improvement in the mean seizure frequency, seizure-free weeks, or quality of life in adults.<sup>41</sup>



**Figure 3** Probable mechanism of auricular acupuncture for the treatment of epilepsy.

Chiropractic in epileptic patients is commonly the correction of the upper cervical area to amend vertebral subluxation.<sup>43</sup> It is theorized that a reduction of abnormal nerve impulses to the brain can be attained through correcting vertebral subluxation in the upper cervical spine with professional chiropractic.<sup>43</sup> Of the 17 cases that were studied, 15 showed promising results after undergoing chiropractic care.<sup>43</sup> However, such a theory is not backed by scientific mechanism, leaving the exact mechanism of which chiropractic care alleviates epilepsy symptoms unknown. Furthermore, there is no available Cochrane review that supports chiropractic care as a treatment option for epilepsy. Hence, even though chiropractic care has been advocated to be beneficial, there is a need for more investigations and clinical trials to be carried out in order to validate its' effectiveness.

## Discussion and conclusion

Extensive reviews and researches have been done on the nutritional aspect of natural therapy. Hence, this article focuses on literature related to self-control methods (meditation and yoga), acupuncture and chiropractic as therapy for seizure disorders due to the lack of literature reviews of the aforementioned therapies. Meditation, yoga, acupuncture and chiropractic practices show promising outcomes

for epileptic patients but has to be extensively studied to provide substantial evidence of their beneficial effects. (Table 1) summarizes the findings of various review articles to indicate the strength of current evidences supporting meditation, yoga, acupuncture and chiropractic as epilepsy treatment therapies.

There is no particular procedure to halt a seizure, and there is no assurance about its effectiveness every time and for everyone. Meditation and yoga as epilepsy treatments still remain a debate with plenty of scope for researchers to explore. Acupuncture and chiropractic are sometimes considered substitutes to conventional medicine as they may change brain activities to reduce seizures. Theoretically, both of these practices sounds virtuous but there is lack of scientific evidence to support them as an effective in epilepsy management. Various dietary modifications may also help in decreasing seizures, ketogenic diet is among one of them. This high fat (Ketogenic) diet is found to be effective in children, but the restrictions are challenging. In conclusion, the brain is a complex network and each and every case is different. Hence, natural treatments may complement existing medical treatment. However, there is insufficient evidence to assess either the benefits or adverse effects of natural therapy and further studies are needed.

**Table 1** Comparison of meditation, yoga, acupuncture and chiropractic as natural therapies for epilepsy

Natural therapy	Cochrane review	Evidence	Limitation	References
Meditation	Absent	2 case studies	The available studies are limited, reviews provide contrasting views and mechanism not fully understood	32-34
Yoga	Present	2 unblinded trials with 50 participants	The available studies are limited with limited number of participants randomized to yoga, lack of blinding and limited outcome measures	35,37
Acupuncture	Present	17 randomised controlled trials with 1538 participants	Available RCTs is small, heterogeneous and have a high risk of bias	42
Chiropractic	Absent	17 individual reports, 15 got treated, but no scientific evidence is available	The available studies are limited and there is a lack of understanding of the mechanism of chiropractic as a therapy	43
Neuro feedback	Absent	10 individual studies, total 87 participants. There was no evidence of significant statistical heterogeneity.	The unclear quality of included studies, the small sample sizes and the possibility of publication bias.	44

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## Conflict of interest

Author declares that there is no conflict of interest.

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