

Lifestyle Change, in addition to Pharmacotherapy, enhances Seizure Control in Young Adults.

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Abstract

Epilepsy is one of the most prevalent neurological disorders that affects about 65 million people globally, especially adolescents and young adults. Despite the availability of anti-seizure medications,30-40% of individuals continue to experience persistent seizures. This review analyzed the effect of lifestyle changes on reducing the frequency of seizures in young adults. In the review, we found that data from multiple randomized controlled trials showed that 7–8.5 hours of quality sleep reduces seizure frequency by 16%, stress management interventions reduce it by 29–35%, structured exercise programs result in 36% fewer seizures, and the Modified Atkins Diet (MAD) decreases seizure occurrence by 50%. These interventions stabilize brain chemicals like Gamma-Aminobutyric Acid (GABA) and glutamate, which control when and how seizures occur.

Introduction

- Young Adults often face academic and life pressures, irregular routines, and stress, which can increase the risk of seizures.
- Approximately 20% of all new epilepsy cases each year occur in individuals aged 14-26 years (Hansen et al.2024).
- Causes of seizures include idiopathic, central nervous system disorders, and lifestyle related changes

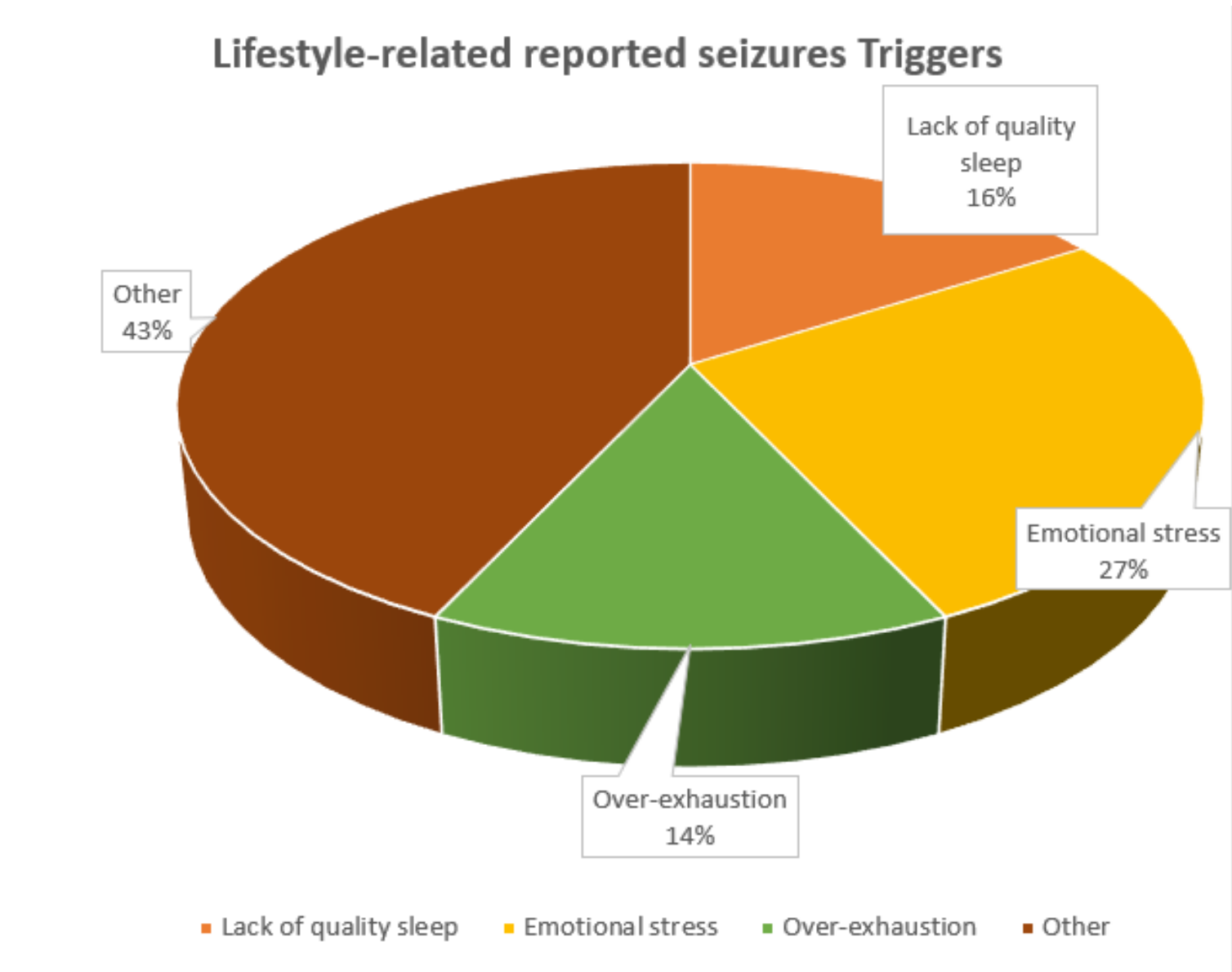


Figure 1. Distribution of life-style related seizure triggers reported in Primary Studies among Young Adults.

- Over half (57%) of lifestyle-related seizure triggers are attributed by emotional stress, stress deprivation, and over-exhaustion (Nakken et al.2005).
- 43% of other reported seizure triggers are various life-style or environmental factors that were reported less frequently by individuals in the study such as missed medication, alcohol, flashing lights, dietary factors etc (Hansen et al.2024)

Methods

- Information was obtained from peer-reviewed Primary articles from databases like PubMed, Google Scholar and Science Direct.
- Focused on studies involving young adults with epilepsy, especially those examining sleep and seizure frequency, structured physical activity, stress management interventions and the Modified Atkins Diet (MAD).
- The articles included randomized controlled trials, clinical trials, and meta-synthesis qualitative analysis studies.

Results

Sleep and Seizures

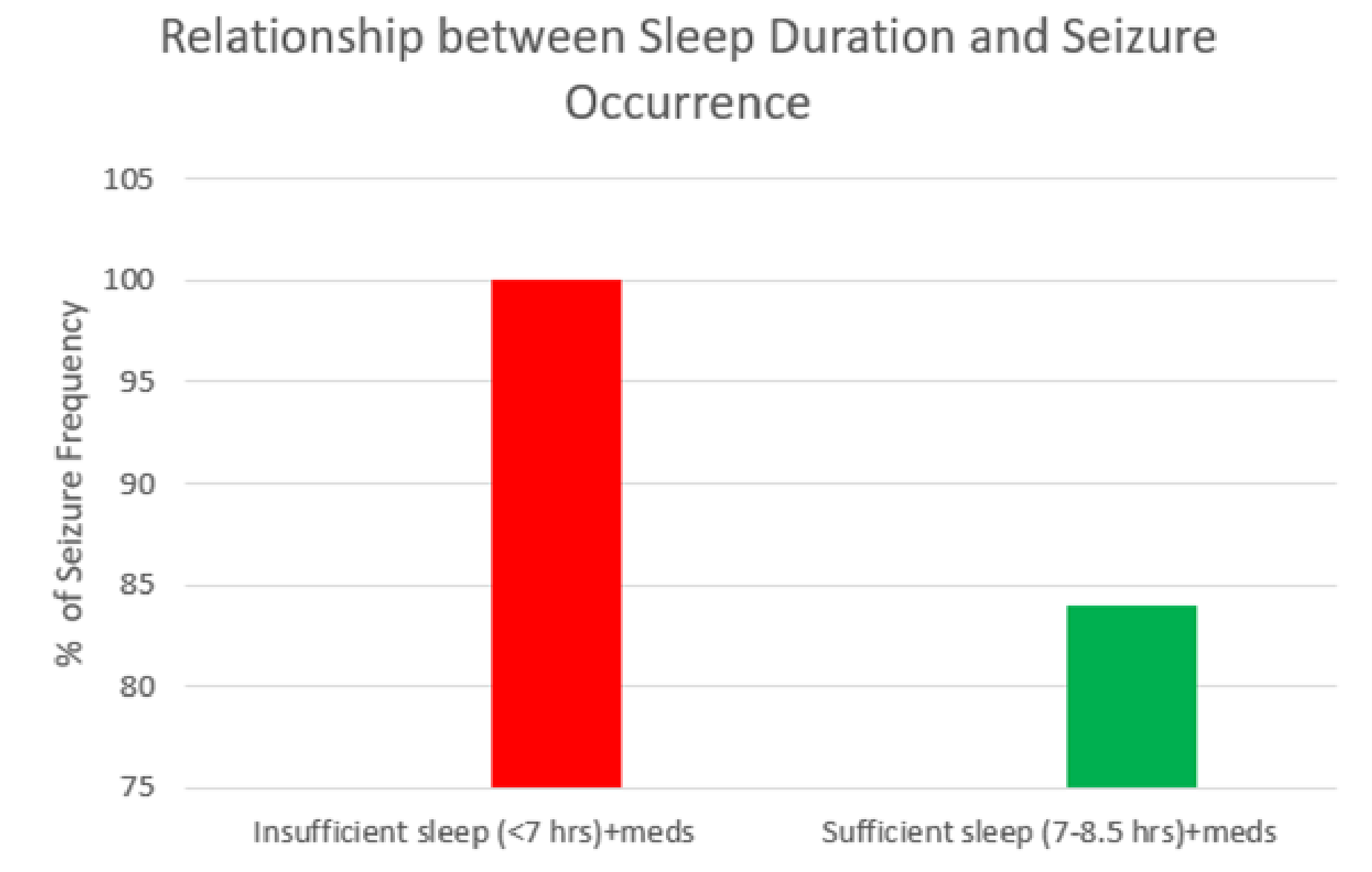


Figure 2.Comparison of average sleep duration and seizure frequency among individuals with epilepsy receiving anti-seizure medication. Participants with insufficient sleep (<7 hours) exhibited higher seizure frequency compared to those with sufficient sleep (7-8.5 hours).

- Insufficient, Lower Quality Sleep (<7 hrs + meds)**

 - Increased neural excitability
 - Disrupted neurotransmitter balance
 - Desynchronized brain wave patterns
 - Higher seizure risk
- Sufficient, Good Quality Sleep (7-8.5 hrs + meds)**

 - Reduced neuronal excitability
 - Balanced GABA activity
 - Synchronized brain patterns
 - 17% fewer seizures (Samsonsen et al.2016).
- Quality and Adequate sleep reduces seizure frequency by 17% (Cobabe et al. 2015).

Physical Activity



Figure 3.Comprehensive Structured Exercise Program for Seizure Management in Young Adults with Seizures.(Regular aerobic, strength, flexibility and Core-Stability Exercises.

- Regular structured physical activity can reduce seizure frequency by ~36% when combined with anti-seizure medication (Häfele et al.2021)
- Exercise increases GABA activity reducing brain hyperexcitability.
- It reduces stress, a major seizure trigger for 27% individuals (Nakken et al.2005).
- It improves sleep quality, which further lowers seizure risk.
- It raises levels of brain derived neurotrophic factor (BDNF), which strengthens one’s inhibitory pathways in the brain like GABA activation to edge up the seizure threshold (Laghetti et al.2018).

Stress Management

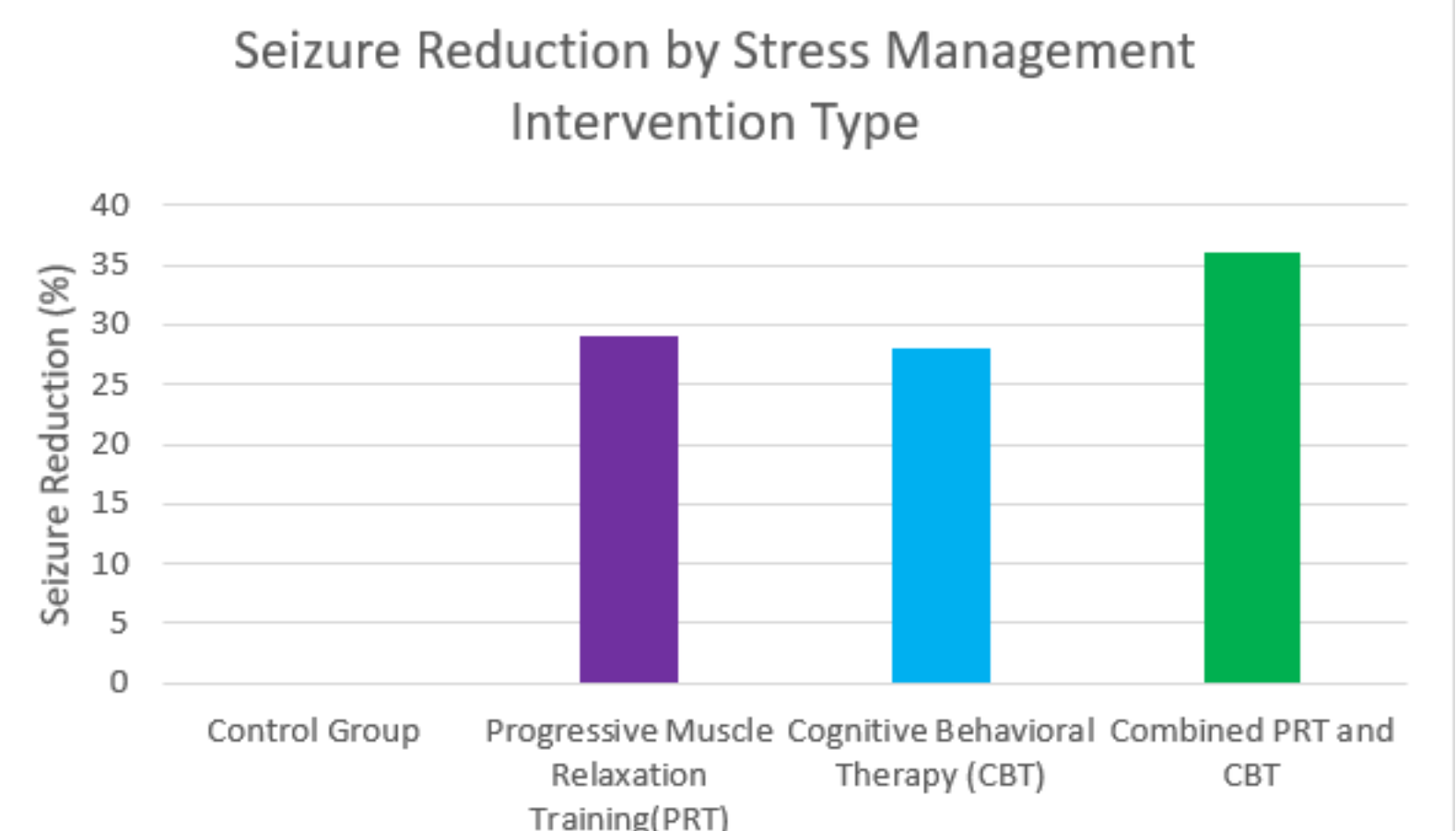


Figure 4.Seizure Reduction achieved through PRT,CBT and combination of PRT with CBT; all which are Stress Management Interventions. This highlights the effectiveness of targeting both physical and psychological Stress.

- Stress activates the HPA axis, increases cortisol, and raises neuronal excitability, which lowers the seizure threshold (Baldin et al.2017)
- Control group under medication only showed no improvement in seizure reduction (Puskarich et al.1992).
- PRT shows ~29% seizure reduction, showing that relaxing the body lowers seizure triggers (Puskarich et al.1992).
- CBT reduces ~28% seizure triggers, revealing that managing thoughts and emotional stress is important (Martinović 2001)
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- Combined CBT and PRT has the highest effect on reducing seizures by ~36%. It targets both body and mind (Lai et al.2021).

Modified Atkins Diet (MAD)

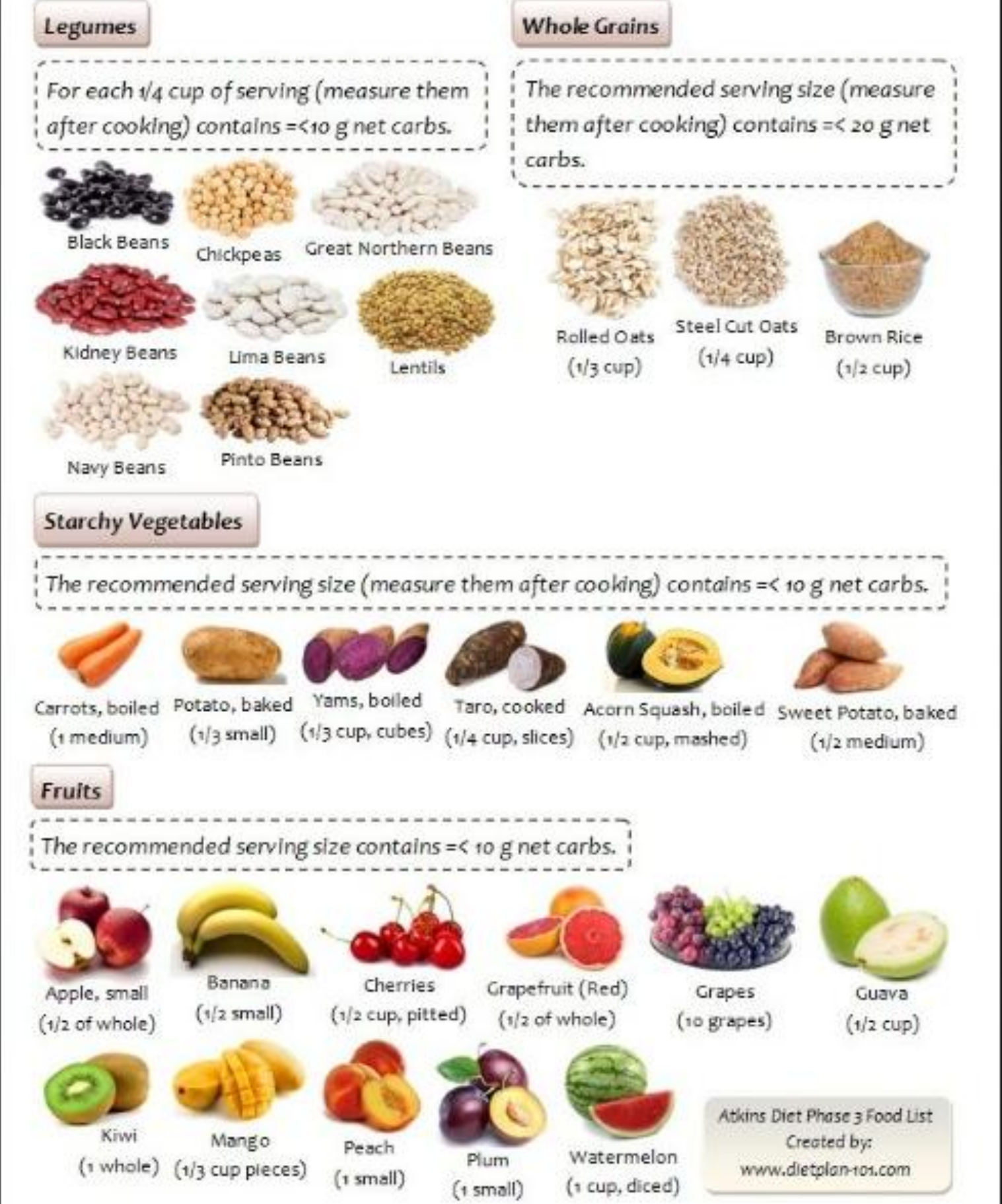


Figure 5. Example of food categories and serving sizes for the MAD, focusing on low-carbohydrate options. The diet restricts large carbohydrate intake through controlled portions of legumes, whole grains, starchy vegetables and fruits. All this helps maintain ketosis, stabilizing neuronal energy supply.

- Clinical Trial Results:**
 - Young Adults with Treatment-Resistant Epilepsy:
 - 67% in 12 weeks of MAD and medication, achieved ≥ 50% seizure reduction (Kverneland et al.2015).

- Randomized Control Trial:
 - 66 young adults with epilepsy in 2-month trial period,35% consistent in MAD and medication achieved ≥50% seizure reduction (Zare et al.2017).
 - 102 children with refractory seizures under MAD for 3 months showed seizures levels reduced to 59% baseline, compared to 96% in the standard care group (Sharma et al.2013).
 - MAD promotes ketosis, providing the brain with a stable energy source that reduces fluctuations in neuronal activity.
 - It increases GABA levels, helping calm overactive brain circuits that trigger seizures (Kverneland et al.2015).

Synthesis and Future Directions

- Lifestyle changes, in addition to pharmacology, may help reduce the frequency of seizures in young adults.
- All interventions balance crucial brain chemicals like GABA and glutamate.
- For future directions, a large multi-center randomized controlled trials can be conducted and confirm long-term effectiveness of combined consistent lifestyle interventions.
- The whole is better than the sum of the parts – there is a need for more trials that combine multiple lifestyle change interventions
- Digital wearable tools can be developed to track consistency in these lifestyle interventions as well as the seizure triggers.

Conclusions

- Lifestyle modifications, consistent sleep, stress management, structured exercise, and the Modified Atkins Diet (MAD), provide meaningful improvements in seizure control among young adults with epilepsy.
- When combined with anti-seizure medications, these interventions create stronger and more consistent positive results in reducing seizure frequency.
- These habits are accessible, low-cost, non-invasive and offer a practical and sustainable approach to long-term seizure management.
- Each lifestyle change targets important neurological pathways by stabilizing neuronal excitability, improving neurotransmitter balance, reducing stress, and enhancing overall brain health.

References



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