

Modified Atkins Diet Limits Seizures in Refractory Epilepsy

Daniel M. Keller, PhD | September 14, 2015

ISTANBUL, Turkey — A modified Atkins diet (mAD) can decrease seizures in adult patients with refractory epilepsy taking antiepileptic drugs (AEDs).

About half of patients experienced a 50% or greater reduction in seizures on the diet, a study shows.

Mohammad Zare, MD, professor of neurology at Kishani Hospital of the Isfahan University of Medical Sciences in Iran, said that on the diet "urinary ketone bodies increased in the case group, and there was a positive correlation between the mean urinary ketone level and greater than 50% seizure reduction in the case group, in contrast to some previous research" ($P = .04$).

He presented the study results here at the 31st International Epilepsy Congress (IEC).

Dr Zare said diet therapy is easy to do, and the mAD has shown benefits in children with refractory epilepsy in several studies. However, it has rarely been studied in well-controlled trials in adults.

In his study, epilepsy was considered refractory when a patient experienced one to two seizures per month despite the use of two full-dose AEDs.

An mAD contains 64% of calories from fat, 30% from protein, and 6% from carbohydrates. In contrast, a standard ketogenic diet provides 90% of calories from fat, 8% from protein, and 2% from carbohydrates. In a standard (nonketogenic) diet, half the calories are from carbohydrate, 35% from fat, and 15% from protein.

Adult patients (aged 18 to 57 years) with two or more seizures per month while receiving two or more appropriate AEDs were randomly assigned to receive AEDs plus the mAD ($n = 22$) or to a control group receiving only AEDs ($n = 32$).

Of the original 34 patients in the AED + mAD group, 12 dropped out of the study because of nonadherence compared with no participants from the control group.

In addition to being excluded for major comorbidities, patients were ineligible if they had previously used the mAD for more than 1 week, were on a ketogenic diet at all during the past year, had status epilepticus, or had a 2-week seizure-free period during the previous 6 months.

Participants in the mAD and control groups did not differ significantly in average age (27 vs 29 years, respectively), duration of epilepsy (17.8 vs 14.1 years), number of AEDs (2.8 vs 3.0), types of seizures, or body mass index (BMI).

The patients in the mAD group were referred to a nutritionist for menu planning, one menu for each day of the week. Before beginning the diet, participants recorded the frequency of their seizures for 1 month. The study ran for 2 months once the diet was initiated.

After 1 month, 25% of the mAD group had a 50% or greater reduction in seizure frequency. At 2 months, the mean number of monthly seizures had decreased significantly, and 54.5% of mAD patients had a 50% or greater reduction in monthly seizures vs no reduction in the control group ($P < .01$; odds ratio, 2.19).

Table. Seizure Activity and Metabolic Parameters in mAD vs Control Groups (Intention to Treat)

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	mAD Group (n = 34) (%)	Control Group (n = 32) (%)	P Value
Baseline monthly attacks	8.5±7	6.5±3.2	.14
First month: mean number of monthly seizures	5.29±3.3	6.34±3.0	.22
First month: ≥50% seizure reduction	6 (25)	0 (0)	<.01
Second month: mean number of monthly seizures	3.54±2.3	5.84±2.9	<.01
Second month: ≥50% seizure reduction	12 (54.5)	0 (0)	<.001
Increased cholesterol level	7 (31.8)	0 (0)	.003
Liver enzyme elevations	5 (22.7)	5 (15.6)	.008
Mean urinary ketone positivity during 2 months (0 - 4+ scale)	1.75±0.28	—	—

No patients in either group were seizure-free during the first or second months of the study. The groups did not differ in BMI by the end of the 2 months.

The Study in Perspective

A few other rather small, open-label, prospective trials using mAD in adults with epilepsy showed similar findings in terms of reduction in seizure frequency. The proportion of patients achieving a greater than 50% reduction in seizure frequency ranged from 12% to 47%.

In none of those trials were any patients seizure-free. Unlike the other trials, which ran for 6 to 12 months, the present trial ran for only 2 months.

The earlier trials, too, had high percentages of participants who dropped out and did not complete them. Some of the adverse effects experienced by the participants were lethargy, weight loss, elevated total and/or low-density lipoprotein cholesterol level, leg swelling, nausea/vomiting, headache, diarrhea, constipation, and weakness.

Dr Zare noted that in his study, an increase in urinary ketones positively correlated with a participant having a greater than 50% reduction in seizures ($P = .04$), which was in contrast to some previous research.

In light of the finding that 54.5% of participants in the mAD group had a greater than 50% reduction in seizures at 2 months, Dr Zare concluded that the diet may be an effective adjunctive treatment for the nearly half of adults with epilepsy who have refractory disease.

Noting that the mAD was designed for children with epilepsy, session moderator Najib Kissani, MD, professor and chairman of the Department of Neurology at University Hospital in Marrakech, Morocco, commented to *Medscape Medical News* that the diet has not been studied extensively in adults, but more data in adults are now emerging.

"This is a nice study — in adults, not in kids — and it has mentioned that 50% have improved after at least 2 months of the diet. So, I think it's a very nice discovery, and that should allow physicians to try this diet in adults in refractory epilepsy cases."

He pointed out that the standard (nonmodified) Atkins diet is difficult to follow, "but the modified one...is quite easy to be followed."

The mAD allows consumption of common foods, such as eggs, fruit, salad, butter, high-fat milk, and tea, with very limited quantities of bread or other carbohydrates. Even with elevations in cholesterol and the formation of ketone bodies, Dr Kissani said the mAD is safe.

He explained how the diet works in epilepsy. With a limited source of carbohydrates, the body is forced to use fats for energy, resulting in the production of ketones, which are water soluble and can enter the brain, where they can inhibit the mechanisms leading to seizures.

"When you have patients not responding to antiepileptic drugs, it's the time to introduce or to add on the diets," Dr Kissani recommends. Although Dr Zare involved a nutritionist in menu planning, Dr Kissani said a nutritionist is not necessary.

"Sometimes you can just reproduce [the diet] and try to balance between the three elements [of] fats, carbohydrates, and protein, and you can...present a sort of modified Atkins diet to be given to the patients to just simplify the task for the physician." He says such an approach should work well in areas with limited resources or trained nutritionists.

The trial was sponsored by Sanofi. Dr Zare and Dr Kissani have disclosed no relevant financial relationships.

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