Management of Cognitive Dysfunction

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Key words: Cognitive dysfunction, elderly, screening, aging brain.

With increasing age cognitive dysfunction becomes very common (1). Older persons with cognitive dysfunction commonly engage in unsafe activities such as poor medication management, driving, and going to their physician alone (2). For this reason, it is important that the primary care physician annually screen persons over 65 years for cognitive dysfunction. The MiniMental Status Examination (MMSE) has been the classical screening test but now requires payment if it is used. Both the Montreal Cognitive Assessment (MOCA) and the St. Louis University Mental Status (SLUMS) examination are more sensitive and specific than the MMSE (3, 4). The MOCA now requires health professionals to pay to be trained to use it and is no longer in the free public domain (5). The SLUMS is free making it the test of choice. However, it takes 6 to 7 minutes to administer. That is too long for the average primary care health professional to administer. The MiniCog and the Rapid Cognitive Screen (RCS) which is derived from the SLUMS are both quicker to administer. The SLUMS can identify people with mild cognitive impairment as well as dementia, making it preferable to the MiniCog (6, 7).

The first of the nootropics introduced to treat dementia was the ergotoxine derivative, hydergine. A meta-analysis found that hydergine significantly improved cognition based on global ratings (8). However, these effects were considered to be modest.

Tacrine was the first cholinesterase inhibitor to be approved by the FDA in 1993. Its approval was withdrawn from the market in 2013 due to side effects. Cholinesterase inhibitors reduce the loss of brain function to a small degree in persons with Alzheimer's disease. Most of the studies are of 6 months or less and improve cognition in approximately 14 out of 100 persons (10). A 5-year study suggested that cholinesterase inhibitors increased the MMSE score by 0.13 points over this time period (11). Up to 30% of patients have side effects. Memantine, an N-methyl-D-aspartate receptor antagonist, together with donepezil improved cognition and global assessment but had more side effects than memantine alone (12). Aducanumab is a monoclonal antibody directed at beta-amyloid that has received accelerated approval to treat early stage Alzheimer's disease (13). The preliminary data for this

drug is at best questionable.

Recently, our group has shown in an epidemiological study that the tetanus, diphtheria, pertussis (Tdap) vaccine markedly reduces dementia in persons receiving it compared to unvaccinated individuals (14). This may be because of activation of regulatory T cells. This effect is much greater than seen with the available drugs for the treatment of dementia.

Table 1. The Treatable Causes of Dementia

Drugs – anticholinergic
Emotional – depression
Metabolic – hypothyroid, B12 deficiency
Ears/eyes deficits
Normal pressure hydrocephalus
Tumors
Infection
Atrial fibrillation
Sleep apnea

Perhaps more importantly there are many treatable causes of dementia. These are easily remembered by the mnemonic – DEMENTIAS (Table 1) (15). Sleep apnea is very common cause of cognitive dysfunction that needs to be recognized and treated (16). Other common treatable causes of dementia include atrial fibrillation, depression, anticholinergic drugs and decreased hearing. Metformin in persons with Type 2 diabetes mellitus reduces dementia (17, 18). The prevalence of dementia has been reduced in the USA over the last decade, most probably due to the treatment of hypertension (19, 20).

Most importantly, there are a number of nutritional and psychological interventions that appear to reduce dementia (Table 2). These include especially fruit and vegetable diets such as the Mediterranean (21) or the MIND diets (22). Extra virgin olive oil further decreases the chance of developing cognitive dysfunction by reducing inflammatory damage in the brain (23, 24). There is some evidence that yogurt (25) and curcumin (26) may also decrease the development of cognitive dysfunction. Oligomannate, which is derived from seaweed, decreases microbiome inflammatory response similar to yogurt and improves cognition (27).

Table 2. Nondrug Treatment of Dementia

1.	Manage treatable causes
2.	Mediterranean or MIND diet
3.	Extra virgin olive oil
4.	Yogurt/curcumin
5.	Exercise
6.	Cognitive Stimulation Therapy (CST)
7.	Reminiscence therapy
8.	Caregiving support

Multiple studies have shown that exercise improves memory (28). The FINGER study showed that a two-year study of Mediterranean diet, exercise, cognitive training and treatment of vascular risk factors compared to a control group resulted in improved executive function and processing speed (29). Cognitive Stimulation Therapy (CST) improves memory as well as available drugs (30, 31) and better in combination with exercise (32). Reminiscence therapy is less effective at improving memory (33). Finally, it should be recognized that high quality caregiving is a key component to maintaining the quality of life of persons with dementia and their family members (34).

Without medications to improve memory it is clear that there are multiple things a health care professional can do to improve cognition. Sadly, most of these are never done. Before health care professionals rush to utilize cognitive enhancers, it is essential that they develop high quality cognitive enhancement programs as outlined in Table 2. It is important to recognize that in geriatric care there is often multiple approaches to enhancing outcomes that do not involve medications.

Conflicts of interest: The author declares there are no conflicts.

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How to cite this article: J.E. Morley. Management of Cognitive Dysfunction. *J Nutr Health Aging*. 2021;25(7):819-820; <http://dx.doi.org/10.1007/s12603-021-1654-y>