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Title: Auditory Training Among Older Adults with Alzheimer Disease and Central Auditory Processing Disorder

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The syndrome of dementia has many types but Alzheimer’s disease is the most common type of dementia. Alzheimer’s disease is a progressive disorder of the central nervous system that involved different regions of cortex such as makes changes in the morphology of cortical cells and also effect on various neurotransmitters, particularly acetylcholine. Because of the involvement of frontal cortex in an early stage of pathology, working memory deficits become manifest. Deficits in memory processes in individuals with Alzheimer’s disease are well documented and one of the features of deterioration of memory functions is working memory (1). Understanding the nature of the function of working memory can probably lead us toward a proper treatment protocol. By definition, working memory is the maintenance of information in short span or duration of time and is essential for communication because of hold information in consciousness (2). The degree and quality of working memory decrease in Alzheimer’s disease may be influenced by some factors. The psychotic status that often associated with Alzheimer’s disease such as depression may be lead to relatively greater
declines in working memory. The capacity of working memory could be decreased in neurodegenerative disease. The decrease in capacity of working memory attributes to a decrease in the activity of dorsolateral prefrontal cortex with aging (3).

As Alzheimer’s disease advanced its expansion to the auditory cortex and higher-level auditory centers, the peripheral auditory system remains normal; this type of hearing problem means central auditory processing disorder (4). Auditory processing refers to the complex of the auditory abilities such as localization, discrimination between sounds, auditory perception, temporal processing, and dichotic performance with the competing message. Individuals with central auditory processing disorder have problems in establishing the relationship between the acoustic signal that they heard and meaning especially in a noisy environment. Because in auditory processing there is a direct connection between auditory discrimination, memory, and interpretation of spoken word (5).

Cognitive deficits involve language abilities and a significant number of individuals with Alzheimer’s disease have language problems even in the early stage of the disease (6). Alter at the cortical level has been shown by auditory training. Both humans and animals studies have shown cortical plasticity that improved auditory perception. There is an interaction between cortical and subcortical plasticity and auditory training demonstrated changed the brainstem response to speech sounds (7). Working memory capacity can be remediated by adaptive training (2). Auditory training is the targeted programs designed to increase the amount of information that human uses for total perception (8). The effects of auditory training on working memory capacity in individuals with Alzheimer’s disease that do not have hearing problems have rarely been studied.

Auditory training incentive individuals to make sound-to-meaning relation that increased cortical activity and motive brain plasticity mechanisms (9). Despite this evidence, auditory training is rarely recommended for older adults with problems in perception. In this situation, designing rehabilitation programs with the aim of speech perception in individuals with Alzheimer’s disease could increase working memory capacity by improves semantic memory (Fig. 1).

![Fig. 1. Connection of events](#)

"This is a theory based on changes in brain activity after auditory training"

Alzheimer's disease involved some of the auditory nucleus on the brainstem. One of these nucleuses is the medial geniculate body (MGB) that is a very important auditory station for central
auditory function and relay information to the cortex (10). Central auditory processing disorder that starting from the temporal lobe may start earlier than Alzheimer’s disease and lead to deficits in speech production (10). Because of higher risk of Alzheimer’s disease in older adults with hearing problems, it is important that we start auditory training for them in the years sooner than the onset of Alzheimer’s disease. So it is very necessary to conduct those type of research based on auditory training and its influence on individuals with Alzheimer’s disease and central auditory disorder.

References