



## Mini Review

# Heightened Vulnerability of Alzheimer's disease in COVID-19 Cataclysm and Putative Management Strategies

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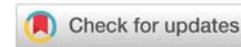
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## Abstract

Alzheimer's Disease (AD) susceptibility has been soared during global pandemic of coronavirus disease 2019 (COVID-19). People of advanced ages, especially those over sixty years old are more vulnerable to AD and COVID-19 conundrum. Concordant and discordant etiology, pathophysiology and management strategies of AD and COVID-19 had been highlighted in this review. Considering the grave concern of AD and COVID-19 specifically on global aged old population, some recommendations for managing both of the crises had been put forward.

## Introduction

According to the World Health Organization (WHO), global number of people over sixty years old will soar from 900 million to 200 billion in the time scale 2015–2050 accounting 12% of current total population up to 22% of that time [1]. As the older people are more vulnerable to age-onset disorders like Alzheimer's Disease (AD), the world is approaching a severe crisis with care giving and management of the vast expanse of aged population [2]. Unfortunately, current corona virus disease 2019 (COVID-19) pandemic has been adding insult to the AD injury [1,2]. Epidemiological studies reveal 20 – 40% of COVID-19 patients are over sixty years of age [3]. Emerging data of escalating COVID-19 cases in aged people warn highly perilious state for those already afflicted with dementia, Mild Cognitive Impairment (MCI) and AD [4]. Family members,

care-givers, health care professionals, researchers and scientists should take necessary steps in managing this ever increasing catastrophe. This state-of-the art review explores the current trends and future aspects of AD in concordance with COVID-19 catastrophe.

### AD – COVID-19 cramp

**Etiology, pathophysiology and co-morbidities:** The menace associated with AD and COVID-19 emanate from both etiological and pathophysiological states. From genetic point of view, people carrying APOEε<sub>4</sub> allele are at increased risk of developing AD at their 6<sup>th</sup> decade of life [5–7]. Similarly, APOEε<sub>4</sub> allele poses extended risk for COVID-19 pathogenesis [5–7]. Angiotensin converting enzyme 2 (ACE 2) is the receptor for entry of severe acute respiratory syndrome corona virus-2 (SARS-CoV-2), the causative agent of COVID-19 [5–7]. Ten



times increased expression of ACE2 has been observed in AD patients, threatening their sustenance [5-7].

AD is a neurodegenerative disorder associated with multiple co-morbidities including cardiovascular diseases (CVD), diabetes, hypercholesterolemia, hypertension, oxidative stress [8]. These co-morbidities intensify the AD-COVID-19 tie with grave consequence on the aged people. Accumulating evidence suggest that COVID-19 patients bear 7-10 times higher risk of developing CVD complications [9]. Even, COVID-19 augments the existing CVD complications [10]. Bidirectional impact between COVID-19 and diabetes patients have been observed that magnify overall metabolic dysregulation [11]. Pneumonia is the most predominant feature of COVID-19 [12]. AD and dementia patients are at escalated rate of developing pneumonia [12].

Similar commination persists for hypertensive patients [13]. and anti-hypertensive drugs such as ACE Inhibitors (ACEIs) and angiotensin II receptor blockers (ARBs) have been found prospective in ameliorating COVID-19 complications [13].

Neurological manifestations abutting COVID-19 are impaired consciousness, delirium, disorientation of space and time, hallucination, schizophrenia, Guillain-Barré syndrome, encephalopathy, aphasia, seizures, tremors, difficulty in problem solving and performing errands, distorted emotional state, cerebral hemorrhage and ischemic stroke [8, 14]. As olfactory neurons become affected, both AD and COVID-19 patients lose smelling and can not differentiate between aroma and bad odor. Even, they fail to enjoy food taste [8,14].

### Management muddle

AD patients, at their severe stages, become solely dependent on their family members and care-givers. Care-givers must attend their patients constantly and aid in their every daily activities ranging from feeding to lodging even during using toilets. COVID-19 management warrants usage of masks, maintenance of social distance, avoidance of personal contact, withdrawn of sharing personal belongings with others, washing of hands repeatedly with sanitizers. Quarantine or self-isolation is another highly practiced stratagem in COVID-19 pandemic. All these management strategies go against AD care-giving and management at home and at hospital [15]. Even, AD patient cannot take his or her own medicine by himself or herself and must rely on others for treatment purpose that violates COVID-19 management process. Perturbed olfactory neuronal activity in AD and COVID-19 patients truss them together to depend on others while management strategy of one mar another. Psychological alteration, anxiety and depression of both types of patients bar them from their common management practices.

### Putative management for AD – COVID-19 havoc

Following are the recommendations that could be applied for management and mitigation of AD – COVID-19 havoc

- a. Continuation of the ongoing treatment and management processes for both AD and COVID-19 patients at home and hospital with proper sanitization.

- b. Personal care of each type of patient emphasizing proper nutritional support.
- c. Practice to engage each type of patient in his or her daily religious activities.
- d. Engagement in meditation.
- e. Support and inspiration from family members and relatives. Passing time with family members and children maintaining distance.
- f. Raising strong bonding between care-givers and patients.
- g. Building community network-based health-care institutions.
- h. Training family members, nurses and health-care professionals so that they can handle any unprecedented circumstance while serving the patients.
- i. Allocating adequate financial support for maintaining health-care system of every nation.
- j. Building international co-operation in fighting against global crisis like AD and COVID-19.
- k. Following the guidelines and recommendations of WHO and other relevant organization and personalities.
- l. Ensurance of vaccination for all, once COVID-19 vaccine is available and disseminates AD medication and management strategies and equipment to all.
- m. Life style modification ensuring sound body and mind.
- n. Therapeutic approaches against AD such as regular intake of choline esterase inhibitors (aricept, donepezil, galantamine, memantine, rivastigmine) [16].
- o. Alternative and complementary medicine based management strategies against AD and dementia, such as intake of edible-medicinal mushrooms including ling zhi or reishi (*Ganoderma lucidum*) [17-24].

### Conclusion

COVID-19 poses grave threat to the already suffering AD patients and also to those ageing over sixty. As the number of population over sixty years old will double by 2050, the risk for developing AD at exponential rate knocks the health-care system overtly. Time is up to take proper steps in tackling this global crisis. Adequate management strategy along with proper medico-therapy, life style modification can beacon towards AD – COVID-19 free global community. Thus, graceful ageing with healthy life style practice and management are of utmost importance.

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