



## Review Article

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# Anosmia – The Missing and Common Link Between Alzheimer’s Disease and Covid-19

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## Abstract

Concurrent evidence of some neurological manifestations in Alzheimer’s disease (AD) and corona virus diseases 2019 (COVID-19) has beaconed towards common links between these two global crises. Among numerous complications, the COVID-19 sufferers suffer from loss of smell or anosmia. Similar experience has been noticed in the AD patients. Thus, AD and COVID-19 might have some common links with respect to pathophysiology and this co-mediation might pave a new vista in withstanding these two calamities in a concerted fashion. Thus, the present article delves out the missing link between AD and COVID-19 followed by direction towards their plausible common controlling strategies.

**Keywords:** Alzheimer’s disease; Anosmia; COVID-19; Neurodegenerative disease; SARS CoV-2

## Introduction

Alzheimer’s disease (AD), the most fatal neurodegenerative disease affecting memory and learning abilities associated with cognitive impairment and behavioral alteration, is an age-onset disease of the elderly over sixties [1]. AD had been known on or after 1901 [1]. Corona virus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome corona virus type 2 (SARS CoV-2), has attracted the global focus since December 2019 [1-3]. However, both of them share some common pathophysiology among which anosmia or loss of smell and odor is a prominent link that would also be their putative therapeutic loop [1-3]. The following paragraphs discuss the underlying causes and consequences along with plausible withstanding strategies.

### Alzheimer’s Disease and Anosmia

Though the symptoms of AD become obvious at the old ages (mostly after sixties), pathophysiological alteration ensue in early young life (third to fourth decade of life) [4]. Thus, if AD management could be strategized at young stage, its progression

could be slowed down. In this context, early sign of anosmia is an important etiological factor in AD management [3-4]. Apart from the other noted reasons of AD such as deposition of amyloid beta (A $\beta$ ) plaques and neurofibrillary tangles (NFT), hyperactivity of acetyl choline esterase, genetic predisposition and involvement of proteomics, a novel approach in diagnosing AD pathogenesis seems to be the “anosmia” [2-4]. This notion is substantiated by the fact that people carrying e4 allele of apo-lipoprotein E4 (Apo E4) are at increased risk of developing AD as well as anosmia [5]. As aging progresses, A $\beta$  and NFT accumulate in neurons of the hippocampus and entorhinal cortex that disrupt olfaction as well as memory and learning processes ultimately leading towards AD complications especially dementia [2-5]. Older people (aged 57-85 years) having hyposmia (reduced ability of smelling) bears two times increased risk of developing dementia within five years than their age matched controls [6-7]. In line with this, those having anosmia, are most prone to develop dementia [6-7]. Thus, anosmia is positively correlated with dementia and AD development.

## COVID-19 and Anosmia

Anosmia is among the most common symptoms of COVID-19 around the globe [2,8]. SARS-CoV-2 uses the ACE2 receptor for entry into host cells and the olfactory tissues harbor ample ACE2 receptors [2,8]. Olfactory tissues might be much sensitive towards SARS-CoV-2 that leads to infection of the olfactory sensory neurons (OSN) ultimately impairing smelling processes [2,8]. Concomitant neuronal death might augment the olfaction process [2,8]. Thus, anosmia remains as the most prevalent and easy-to-detect COVID-19 complication.

### Anosmia – the missing link and/or common link between AD and COVID-19

As loss of smell is the early determining symptom of AD and an early marker of COVID-19, anosmia stands as the bridging point between AD and COVID-19. Thus, anosmia might be the missing link between these two pathophysiologies. Anosmia is reflected through neurological complications that also commonly link AD and COVID-19, both of which entail neuro-psychiatric impairments. Thus, treatment strategies aimed at ameliorating anosmia might have seminal impact on withstanding the progression of both AD and COVID-19. As a whole, anosmia, the missing link, might turn into the common link for treating the global crises.

### Conclusion

Anosmia had been reported to be linked with the pathophysiology of both AD and COVID-19. Early detection of anosmia and appropriate measures to mitigate this might aid in lowering AD and COVID-19 vulnerabilities. Anosmia-targeted therapeutic strategies and policy making would help us attaining a world free of COVID-19 and less loaded with AD patients.

## Acknowledgement

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## Conflict of Interest

No conflict of interest.

## References

1. Rahman MA, Abdullah N, Aminudin N (2015) Interpretation of Mushroom as a common therapeutic agent for Alzheimer's disease and cardiovascular diseases. *Critical Reviews in Biotechnology* 36(6): 1131-1142.
2. Rahman MA, Islam K, Rahman S, Alamin M (2020) Neurobiochemical Cross-talk Between COVID-19 and Alzheimer's Disease. *Molecular Neurobiology*. 19: 1-7.
3. Rahman MA, Habiba, U (2021) COVID-19 and neuropsychiatric disorders: Common links and extended networks. *J Neurol Neurol Sci Disord* 7(1): 024-026.
4. Rahman MA, Rahman MS, Alam N (2020) Heightened Vulnerability of Alzheimer's disease in COVID-19 Cataclysm and Putative Management Strategies. *Annals of Alzheimer's disease and Care*. 4(1): 027-029.
5. Manzo C, Serra-Mestres J, Isetta M, Castagna A (2021) Could COVID-19 anosmia and olfactory dysfunction trigger an increased risk of future dementia in patients with ApoE4? *Med Hypotheses* 147: 110479.
6. Kotecha AM, Corrêa ADC, Fisher KM, Rushworth JV (2018) Olfactory Dysfunction as a Global Biomarker for Sniffing out Alzheimer's Disease: A Meta-Analysis. *Biosensors (Basel)* 8(2): 41.
7. Adams DR, Kern DW, Wroblewski KE, McClintock MK, Dale W, et al. (2018) Olfactory Dysfunction Predicts Subsequent Dementia in Older U.S. Adults. *J Am Geriatr Soc* 66(1): 140-144.
8. Mathew D (2020) Loss of Smell in COVID-19 Patients: Lessons and Opportunities. *Front Hum Neurosci* 14: 598465.