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The Possible Interaction between Social Isolation and Protein Malnutrition on Induction and Progression of Alzheimer's disease in Rats

Azza A. Ali [1], Mona M. Kamal[1], Asmaa Saleh[2], Hanan A. Abd El-Samea[3], karema Abu-Elfotuh[1]

[1] Pharmacology & Toxicology Department

[2]Biochemistry Department

[3]MSc of Pharmacology & Toxicology, Faculty of Pharmacy, Al-Azhar University, Cairo, Egypt

Background: Alzheimer's disease (AD) is a neurodegenerative disease characterized by deposition of Beta-amyloid peptides (Aβ), accumulation of neurofibrillary tangles and memory loss. Social isolation (SI) may exacerbate memory deficits where the risk of cognitive decline may be lower by maintaining social connections. Protein malnutrition (PM) increases oxidative damage in cortex, hippocampus, cerebellum and is implicated in the progression of AD.

Objective: To study the influence of SI together with PM for different periods on DNA fragmentation, β-Secretase, biochemical and histopathological changes in normal rat brain as well as to investigate their possible interaction during induction and progression of AD.

Methods: Rats were daily treated either for three or four weeks as following: Normal control received saline, Control AD model injected by ALCl3 (70 mg/kg, IP), SI-associated AD model, PM (10% casein diet)-associated AD model, SI-associated PM model and SI&PM-associated AD model. Isolated rats were housed individually in cages covered with black plastic. Biochemical changes in the brain as acetyl cholinesterase (ACHE), Aβ, tau protein, brain derived neurotrophic factor (BDNF), monoamins (DA, 5-HT, NE), inflammatory mediators (TNF-α, IL-1β), oxidative parameters (MDA, SOD, TAC) and β-Secretase as well as DNA fragmentation were estimated for all groups. Histopathological changes in different brain regions were also evaluated.

Results: SI together with PM for three and four weeks resulted in brain neurological damage indicated by significant increase in β-Secretase, Aβ, tau protein, ACHE, MDA, TNF-α, IL-1β and DNA fragmentation as well as significant decrease in SOD, TAC, BDNF and monoamins in both normal and AD brain. However, brain neurological damage was more severe when SI and PM were associated with AD especially after 4 weeks. These results were confirmed by histopathological changes in different brain regions.

Conclusion: SI and/or PM induced brain neuronal degenerations. More pronounced and sever effects were shown after 4 weeks especially in AD model. Consequently, socialization and adequate protein nutrition are advised especially with AD to avoid the severity and the progression of the disease.

Key words: Alzheimer's disease; Social isolation, Protein malnutrition, Neuronal degeneration, Socialization, Rats

Speaker Biography

Prof. Azza A Ali has completed her PhD specialized in Pharmacology and Toxicology from Faculty of Pharmacy, Cairo University. Her postdoctoral studies included different scientific aspects related to her specialization field with giving especial interest to researches of neuropharmacology and psychopharmacology; she also developed research line of behavioral pharmacology in Egypt. She is member of many scientific societies in Egypt as well as of (AAPS) American Association of Pharmaceutical Scientists (2002) and (ISTAART) The Alzheimer's Association International Society to Advance Alzheimer's Research and Treatment (2016). She published more than 50 papers in reputed journals, supervised and discussed more than 80 PhD, MSc thesis and actively participated by oral and posters presentations at many international conferences especially on Alzheimer's disease & Dementia as Dementia 2015, 2016 and Alzheimer's Association International Conference (AAIC 2016). She has many appreciation certificates and certificate of best presentation award at 19th International Conference on Environmental Pollution and Pollution Control (ICEPPC 2017). Now she is a Head of Pharmacology and Toxicology Department at Al-Azhar University and she sacrifices great effort hoping to find real treatment that can prevent or delay the progression of Alzheimer's disease especially in the high-risk individuals focusing on depression, stress and malnutrition.

e: azzamoro@gmail.com

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