

7<sup>th</sup> World Congress on **Addictive Disorders & Addiction Therapy**  
&  
29<sup>th</sup> International Conference on **Sleep Disorders and Psychiatry**

July 16-18, 2018 London, UK



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### Understanding common patho-physiologies associated with dementia and cognitive decline in sleep deficiency and diabetes

**Statement of the Problem:** We aim to understand and hypothesize the common pathophysiology of dementia & cognitive decline in chronic sleep deficiency and type 2 diabetes mellitus.

**Methodology:** We focus on the literature review to hypothesize the common pathophysiology of dementia & cognitive decline in sleep deficiency and diabetes.

**Findings:** We earlier investigated the association of poor diabetes control and corresponding cognitive decline in a pilot study (n=60). In this study, HbA1C (marker for average diabetes control) values in the diabetic group (n=30) were found to be significantly negatively correlated (Pearson's coefficient of correlation) with the various cognitive batteries: general practitioner assessment of cognition (GPCOG)=-0.53; attendant informant tool (AI)=-0.43; memory impairment screen (MIS)=-0.37; negative values of the Pearson's correlation "r" indicates that lower the respective battery score, poorer is the cognitive function. Similarly, literature suggests that chronic sleep deprivation can lead to cognitive decline and dementia. Research suggests that sleep is associated with the memory consolidation which actually occurs in the non-hippocampal area of the brain i.e. neocortex. This process can lead to the LTP (long term potentiation of the memory). This signifies the importance of the hippocampal and neocortical region of the brain associated with the memory retention and consolidation respectively. In uncontrolled and prolonged diabetes multiple factors like brain insulin resistance, micro-cerebral infarcts and advance glycemic end products can lead to brain ageing leading to cortical and hippocampal atrophy. This in turn impairs the retention and consolidation processes occurring during the sleep.

**Conclusion:** There is a strong evidence of correlation of poor diabetes control and cognitive decline. Since the memory retention & consolidation processes have been attributed to the sleep cycle, it is hypothesized that diabetes mellitus and sleep deficiency share common pathophysiology. Going forward, studies need to be conducted at a larger scale to validate this concept.

### Recent Publications

1. Gupta A, Singh A, Deka R C, Gupta R and Jha R (2018) To investigate role of glycosylated hemoglobin (HbA1c) as a biomarker for prediction of dementia and cognitive dysfunction in type 2 diabetic patients. *Journal of Alzheimer's Disease & Parkinsonism* 8:437.
2. Milne N T, Bucks R S, Davis W A, Davis T M E, Pierson R, Starkstein S E and Bruce D G (2018) Hippocampal atrophy, asymmetry, and cognition in type 2 diabetes mellitus. *Brain and Behavior* 8(1):e00741.
3. Moran C, Phan T G, Chen J, Blizzard L, Beare R, Venn A, Münch G, Wood A G, Forbes J, Greenaway T M, Pearson S and Srikanth V (2013) Brain atrophy in type 2 diabetes: Regional distribution and influence on cognition. *Diabetes Care* 36(12):4036-4042.
4. Wang J, Zhang Y W, Zhang J Q, Liu C, Wei P, Zhang X, Yuan Q Y, Yin X T, Wei L Q and Cui J G (2015) Memory dysfunction in type 2 diabetes mellitus correlates with reduced hippocampal CA1 and subiculum volumes. *Chinese Medical Journal* 128(4):465.

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5. Bannerman D M, Sprengel R, Sanderson D J, Mchugh S B, Rawlins J N P, Monyer H and Seeburg P H (2014) Hippocampal synaptic plasticity, spatial memory and anxiety. Nature Reviews Neuroscience 15(3):181–192.

### Biography

Aman Gupta is involved in research and development activities with various academic and industry organizations and also at individual level. He has a Clinical background followed up by PhD in Neurosciences and Visiting Fellowship - Functional MRI - Harvard Medical School, Boston, MA, USA. He is currently associated with Nuffield Department of Clinical Neurosciences, Graduate reading Sleep Medicine. His research and clinical interest are sleep medicine, dementia of various aetiologies and other neuro-degenerative disorders.

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