Background
Type three diabetes is a term recently coined to unveil the link between type 2 diabetes mellitus (T2DM) and dementia, specifically Alzheimer’s Disease (AD). In 2015, type 2 diabetes was the sixth leading cause of disability in the United States. It is characterized by unusually high levels of glucose in the blood. The etiology of T2DM is largely due to insulin resistance combined with disturbance in the key role of insulin producing beta cells. Alzheimer’s disease is the most common form of dementia and becomes worse over time. Brain glucose metabolism is reduced in AD and glucose metabolism is also impaired in cells as an epidemiological characteristic of T2DM. There is a growing interest to study the link between these two diseases.

Objectives
The object of this systematic review is to investigate the following research question: How are patients with type 2 diabetes mellitus at an increased risk for dementia, such as Alzheimer’s Disease, compared to patients without diabetes? This review examined the link between these two diseases.

Study Design
A systematic review was conducted by searching electronic databases of current literature, published from January 2010 to January 2019, using the PRISMA Protocol. Articles that met the criteria (subjects >18 years old) were selected by one reviewer. Electronic databases (PubMed, Cochrane, Proquest, Scopus, PsycInfo, and SocInfo) were used to find articles with key search words: “Dementia + Type 2 Diabetes Mellitus” OR “Alzheimer’s Disease + Type 2 Diabetes Mellitus.” Nine studies were used in this systematic review.

Results
In this systematic review, the results show a positive association between type 2 diabetes mellitus in mid-life and later dementia, such as Alzheimer’s Disease. At the cellular level insulin unlocks the cell’s ability to metabolize glucose. In type two diabetes mellitus, insulin is resisted by the cell which leaves glucose roaming the blood with no where to go. Likewise, the metabolism of glucose in the human brain is completely dependent on insulin. In the event where no insulin is present, glucose, which is an energy source for the neurons, can not be used and the neurons begin to degenerate. This degeneration leads to cell death of the neuron; as a result, cognitive and memory functions are impaired and lead to Alzheimer’s Disease.

Conclusions:
This systematic review explains the relationship between type 2 diabetes mellitus and the formation of Alzheimer’s disease. This review also indicates how those with type 2 diabetes mellitus are at an increased risk of Alzheimer’s disease because of the metabolic problems of insufficient insulin for cells; this prevents the uptake of glucose in the cells, as seen in the neurons of the brain. Further study into oxidative stress will be necessary to clarify the etiology of type 2 diabetes mellitus along with Alzheimer’s Disease.

References:
Walker RM, Harrison FE. Shared neurochemical characteristics of obesity, type 2 diabetes and Alzheimer’s disease: impacts on cognitive decline. 2015;7(9):733-737.