



Research Article

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Are changes in body composition during middle age predicting marker for Alzheimer's disease?

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ABSTRACT

The variations of body composition can reportedly be used to provide early detection of populations at risk for neurodegenerative diseases associated with metabolic dysfunction, such as Alzheimer's disease. Therefore, the present study aimed to review the relation between of body composition changes and MCI as a predictive marker for Alzheimer's disease. A literature search was performed in different database using the key word: "body composition" and "adipose tissue" with "mild cognitive impairment" to identify all potentially relevant publications relating to study. The search strategy sought only studies published in English and studies on human diseases between 1998-2014. It can be concluded that as measures of body composition, particularly central obesity, seem to be better predictors for Alzheimer's disease compared to BMI and central obesity has been related to high risk of dementia but more research is needed in this area.

Keywords: Body composition, biomarker, Alzheimer's disease, Predicting, early detection

INTRODUCTION

Mild cognitive impairment(MCI) refers to syndrome detect as cognitive decline more than one would expect for an individual's age but that does not interfere with activities of daily life(1). Epidemiological studies show prevalence from 3% to 19% in adults older than 65 years(2). studies have shown that some individuals with mild cognitive impairment seem to remain stable or return to normal over time, but patient at high risk progress to dementia and subtype of mild cognitive impairment has a high risk of progression to Alzheimer's disease(3).The etiology of cognitive decline and dementia is very complex and is based upon the interplay of genetic and environmental factors(4). It has been reported that that the criteria and marker in diagnosis of MCI can be made in a fashion similar to the clinical diagnoses of dementia and AD. During the recent years using biomarkers for predicting disease progression or predicting treatment response has been dramatically developed. Use of biomarker is the clinical criteria for indicating the MCI but is needed to validate for use in community settings(5, 6). Several studies suggest that the metabolic syndrome may be important in the development of cognitive decline and an abnormal body mass index in middle age has been considered as a predictor for the development of dementia(7). The findings of our previous studies on the alterations of body composition among athletes (8) and diabetic patients (9, 10), and the

findings of cellular and molecular studies on Alzheimer's disease and other neurological disorders (11) addressed a possible relationship between the status of body compositions and the risk factors of Alzheimer's disease. Body composition assessments may have predictive values for early detection of the populations under the risks for neurodegenerative diseases associated with metabolic dysfunction, such as Alzheimer's disease (12). Therefore, this study comprehensively reviews the relation between of body composition changes and MCI as a predictive marker for Alzheimer's disease.

MATERIALS AND METHODS

A literature search was conducted in Pub Med database using the key word: "body composition" and "adipose tissue" with "Mild cognitive impairment" to identify all potentially relevant publications relating to study. The search strategy sought only studies published in English and studies on human disease between 1998-2014. It was limited for words in the title and summary of study. According to these criteria, 19 studies available for review were used in this study (Table 1).

Table1. The characteristics and main findings of the studies reviewed in the study

Main result	Explained study	methods	Researcher
van Kan GA(13)	nested case-control study N=181 women at 75 years and older	Evaluate the relationship between Body composition parameters at inclusion and 7 years and cognitive dysfunction.	No significant association could be found.
Vikarunnessa S(14)	cross-sectional study N= 57 persons with MCI or AD and 42 person for control	Determine body fat content and distribution in subjects with mild cognitive impairment (MCI) and AD.	No significant difference in BMI AND Cases also had a trend for higher truncal/lower extremity fat ratio.
Baker LD(15)	Randomized, double-blind, placebo-controlled trial. N=61 adult with MCI and 76 healthy participants.	Examine the effects of GHRH on cognitive function in adults with MCI	Treatment indicated a favorable effect of GHRH on cognition and increased insulin like growth factor 1 and reduced percent body fat.
Zeki Al Hazzouri A(16)	N= 579 older women from the prospective cohort Study of Osteoporotic Fractures.	determine if leptin and anthropometric measures are associated with risk of dementia or MCI	Higher serum Leptin may be a better predictor of dementia/MCI than traditional anthropometric measures.
Kamogawa K(17)	N= 517 middle-aged-to-elderly community-dwelling persons at cross-sectional study	Investigation of abdominal fat distribution under conditions of MCI and the possible involvement of leptin and adiponectin	A 10 mg/l increase in plasma adiponectin had a protective effect against the development of MCI in men. But, MCI was not associated with adipose-derived hormones in women.
Boyle PA(18)	N= More than 700 older persons without cognitive impairment at baseline that 305 persons developed MCI at 12 years of annual follow-up	examine the relation of the baseline level of physical frailty with the risk of developing MCI	Physical frailty (grip strength, timed walk, body composition and fatigue) is associated with an increased risk of MCI and a more rapid rate of cognitive decline in aging.
Cronk BB(19)	N= 286 MCI subjects enrolled in the Alzheimer's Disease Neuroimaging Initiative at 1 year follow-up	Examine the relationship between BMI and cognitive decline in subjects diagnosed with MCI.	Lower baseline BMI is associated with more rapid cognitive decline in MCI
Ellis KA(20)	N=1112 individuals aged over 60 to assist with prospective research in AD at 18-month intervals.	Determine the predictive utility of various biomarkers, cognitive parameters and lifestyle factors as indicators of AD, and as predictors of future cognitive decline.	The only difference between groups was observed in the weight measures with AD patients weighing less than both HCs and MCIs.
Marino LV(21)	N=36 individuals of both genders with AD diagnosis, and no other associated type of dementia at Cross-sectional observational study.	Assess the nutritional status of Alzheimer's disease (AD) patients according to disease stage.	Greater impairment of general nutritional status was observed in the more advanced stages of AD.
West NA(22)	N=1,351 Latinos, aged 60–101 and residents of the Sacramento, CA, area at cohort study.	Assess of BMI and waist circumference in late life with incidence of MCI.	Abdominal fat in late life appears to confer an increased risk for dementia/CIND, whereas overall obesity appears to be protective.

RESULTS AND DISCUSSION

Evidence indicates that adiposity associated with brain changes in late life appears to be independent of those due to normal aging and it may be markers for changes in energy metabolism that related to mild cognitive impairment

(MCI) as a state, which represents a less severe form of the neuropathological process and ultimately AD(23). Several studies have demonstrated that lower baseline BMI is linked to greater risk of Alzheimer's disease(19, 24), but other studies have indicated No significant relation in BMI and cognitive dysfunction in a time-dependent manner(13, 14). It seems that fat distribution, especially abdominal fat, plays a stronger role in longitudinal decline in the cognitive performance of older adult(22).

Adipocytokines such as leptin and adiponectin, released from adipose tissue, may play an important roles in the physiopathology of psychiatric and neurodegenerative disorders and cognition(16, 25). Decreased circulating concentrations of adiponectin are determined by intra-abdominal fat mass(26) and it may be a marker of the pathological process in AD, linking inflammation and cognitive dysfunction(27). In the other hand, subcutaneous abdominal fat is a good and negative predictor of leptin concentration(28) and higher serum leptin was prospectively associated with lower odds of dementia(16). So, it can be concluded that as measures of body composition, particularly central obesity, seem to be better predictors for Alzheimer's disease compared to BMI and central obesity has been related to high risk of dementia But more research is needed in this area.

CONCLUSION

It can be concluded that as measures of body composition, particularly central obesity, seem to be better predictors for Alzheimer's disease compared to BMI and central obesity has been related to high risk of dementia but more research is needed in this area.

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