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Alzheimer's in America: Effective Physical Activity Methods for Brain Health Reviewed

Royale Cannon
University of Nevada, Las Vegas, cannonrs@unlv.nevada.edu

Laurel M. Pritchard
University of Nevada, Las Vegas, laurel.pritchard@unlv.edu

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Royale Cannon, McNair Scholar, Psychology
Dr. Laurel M. Pritchard, Mentor, Psychology

INTRODUCTION

The alarming rise in rates of Alzheimer's disease indicates that there is an immediate need for a solution. According to the Centers for Disease Control and Prevention (2014) Alzheimer's is currently the sixth leading cause of death in the United States. Over 400,000 new cases are diagnosed each year and these numbers are only expected to rise (Centers for Disease Control, [CDC] 2014). One out of nine people are living with the disease and 84,000 people succumb to this disease every year in America; currently there is no cure or direct treatment plan for the disease (Alzheimer's Association, [AA] 2010; National Institute on Aging, [NIH] 2015). These numbers are very significant; almost a quarter of the population diagnosed dies every year. Being that Alzheimer's is a leading cause of death, its presence cannot be ignored. The lack of a cure encourages researchers to seek out protective interventions in order to decrease the risk of developing the disease in later life.

The purpose of this study will be to assess the effect of physical activity in middle adulthood on delaying the onset of Alzheimer's disease. This study will identify trends in ongoing physical lifestyle activities that reduce the entire population's chance of developing the disease in later life. This will contribute to previous research by focusing on prevention to reduce risk of cognitive decline and implementing a suggested intervention for middle-aged adults that will decrease the likelihood of Alzheimer's being developed and help to delay the progression.

METHODS

A systematic review study design was used to evaluate previous study data which met the inclusion criteria. The process included searching studies that included the terms Alzheimer's disease, dementia, cognitive decline, physical activity, exercise, middle adulthood, and late adulthood. A variety of scholarly studies were selected from three databases, Web of Science, PubMed and PsychINFO, as well as websites and reference lists with a direct relation to physical activity participation and some form of cognitive decline. Prospective cohort and case control studies were included that measured physical activity as an independent variable and cognitive function as an outcome. The data extracted from the articles included both odds and risk ratios among the outcome variables. Studies were included that examined physical activity at a baseline of mid-life (ages 40-60), and late life cognitive impairment. Studies examining cognitive or mental activities, dietary interventions, or interventions other than physical activity were excluded. Physical activity performed throughout life was evaluated on moderation/frequency and intensity, and the impact it has on cognitive decline.

Keywords: Alzheimer's disease (AD), Cognitive decline (CD), Physical activity (PA), Dementia, Physical Exercise (PE)

DATA ANALYSIS

Data was collected using inclusion criteria from longitudinal cohort studies and statistically analyzed in alignment with PRISMA review standards. Our original search yielded a total of 24 articles, four of these articles met the inclusion criteria and were included in the data analysis. The other 20 articles that did not meet the criteria were excluded; due to not measuring cognitive function, not studying the target mid-age population, and no clear definition as to how physical activity was measured. Data was categorized and listed (Table 1) in order to organize the data from all studies included. These categories will include physical activity factors that are being evaluated age, activity type, intensity of activity, frequency, and outcome measured. This data will be analyzed in a statistical meta-analysis and will only include the outcomes that include AD/Dementia and cognitive impairment due to dementia related symptoms.

RESULTS

Table 1.

First Author	Outcome	Age (Mean) Base/Follow up	PA/PE
Kulmala, J	Dementia	50.6/71.3/78.8	PA Active, Moderate, Sedentary/Breathlessness and Sweating
Tolppanen, A	Dementia & AD	50.9/74.9	PA 20-30 mins per session/Low, Moderate, High (Breathlessness and Sweating)
Tripathi, M	Dementia	65/75	PE 30+ mins/4x week, 10 years (Brisk Walking)
Virta, J	CI	51.7/74.3	PA 30+ hours/Sedentary, Occasional, Conditioner (Vigorous Walking)

Table 1 lists four studies included in the data analysis are categorized above by Author, Outcome, Age at baseline and follow up, and Physical Activity or Exercise.

Table 2.

First Author	Ratio Low Act. (95% CI)	Ratio Mod Act. (95% CI)	Ratio High Act. (95% CI)
Kulmala, J	2.20 (1.10-4.40)	1.30 (0.80-2.20)	1
Tolppanen, A	1.40 (1.01-1.95)	1.46 (1.08-1.48)	1
Tripathi, M	2.85 (1.34-5.84)		1
Virta, J	2.52 (1.10-5.76)	1.94 (0.92-4.12)	1
Mean	2.24 (1.16-2.86)	1.56 (1.23-1.94)	1

Table 2 includes means and standard deviations from the four studies for low, moderate and high activity levels.

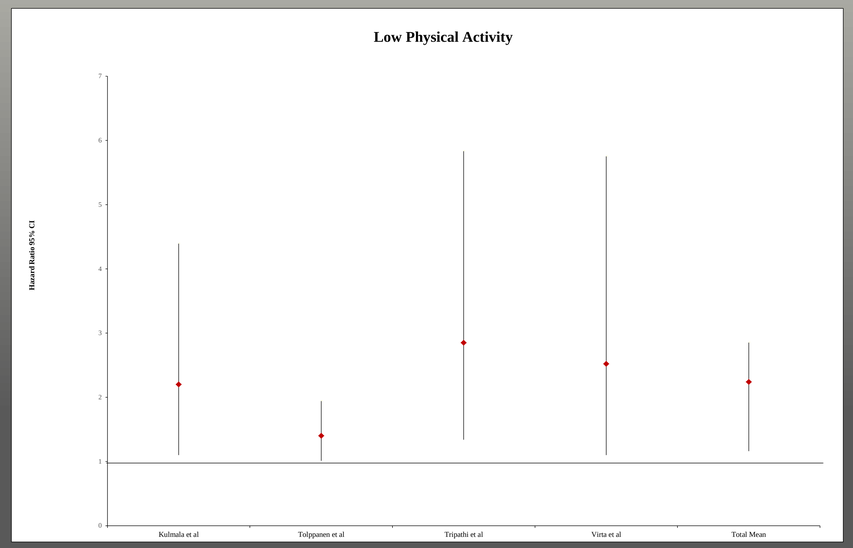

Figure 1 represents low physical activity levels for all four samples and the total mean compared to the control group (1).

RESULTS

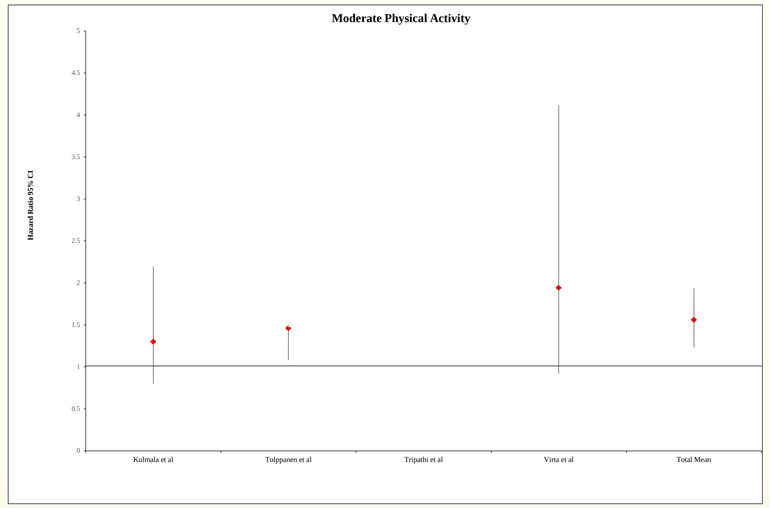

Figure 2 represents moderate physical activity levels for all four samples and the total mean compared to the control group (1).

CONCLUSIONS

According to our data it has been shown that physical activity done early and consistently throughout life can be conducive for reducing the chance of developing Alzheimer's disease, dementia and other related cognitive impairment. Participating in vigorous level physical activity for thirty minutes or more, three or more times a week can protect cognitive function. Research in this area needs to be regulated in order to measure the type of activity, frequency, intensity and duration of time needed to be effective in protecting cognitive function. Also standardizing cognitive tests inventories, like the STROOP or WAIS will make it easier to analyze the data amongst different studies. Incorporating these ideas into future population based, longitudinal studies can help us gather useful data to pinpoint positive protective factors that will preserve cognitive function and help relieve the stress and burden incurred by families and communities when dealing with cognitive impairment.

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