ELSEVIER

Alzheimer's & Dementia ■ (2017) 1-7

Alzheimer's & Dementia

Featured Article

Post-traumatic stress disorder and risk of dementia among members of a health care delivery system

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Abstract

Introduction: Post-traumatic stress disorder (PTSD) is associated with an increased risk of dementia in male veterans, but little is known in females and civilians.

Methods: PTSD and comorbidities were abstracted from medical records from 1/1/1996 to 12/31/2001. Dementia incidence from 1/1/2002 to 12/31/2014 in 499,844 health care members aged 60+ years over an average of 8.2 years. Cox proportional hazard models were adjusted for age, demographics, and comorbidities.

Results: PTSD was associated with increased risk of dementia over an average of 8 years of follow-up (females: hazard ratio [HR] = 1.59, 95% confidence interval [CI] = 1.30–1.95; males: HR = 1.96, 95% CI = 1.51–2.55). There was a two-fold risk of dementia in those with both PTSD and depression (females: HR = 2.08; 95% CI = 1.66–2.59; males: HR = 2.06; 95% CI = 1.47–2.91) versus those without.

Discussion: PTSD was a risk factor for dementia in both sexes, with a heightened risk in those with comorbid depression.

Keywords: Dementia; Post-traumatic stress disorder; PTSD; Sex differences; Alzheimer's disease

1. Introduction

Post-traumatic stress disorder (PTSD) is a common mental health problem with long-term health consequences. PTSD has a known etiological agent, experiencing an event that involves life threat, serious injury, or risk of death in early or late life [1]. Research suggests that the lifetime prevalence of PTSD for older adults ranges from 3% to 6% [1–3]. Studies have found that PTSD is associated with a higher risk of dementia in male veterans [4,5]. Findings suggest that older male veterans were nearly two times as likely to develop incident dementia compared with those without PTSD, whereas a recent study in Taiwan found that both male and female patients with PTSD had a nearly four times higher risk of dementia [6]. Yet, there are currently no studies in the US examining whether PTSD is a risk factor for dementia in older females. This is quite alarming, given that PTSD and dementia are more prevalent in females.

Studies have shown that the prevalence of PTSD is more than two times higher in females compared with males [7]. Annual estimates from the National Comorbidity Survey suggest that 10% of females versus 5% of males have PTSD [8]. Other studies have found that the prevalence of PTSD was as high as 13% in females and 6% in males [9]. In a population-based study of older adults aged ≥60 years, the lifetime prevalence of PTSD was 6% for females and 3% for males [3]. Although research has suggested that females may be less likely to experience certain types of traumatic events, they develop PTSD more often than males [10,11].

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http://dx.doi.org/10.1016/j.jalz.2017.04.014

Studies have linked stress and PTSD to an increased risk of memory impairment and dementia in later life [12–16]. There is also a higher incidence of chronic illnesses in individuals with PTSD, including depression, traumatic brain injury (TBI), diabetes, stroke, and heart disease [16,17]. These chronic conditions may link PTSD to higher rates of dementia. For example, depression is associated with a 2- to 3-fold increased risk of dementia [18,19]; and comorbid depression among individuals with PTSD is very common, with estimates of co-occurrence ranging from 30% to 50% [20,21].

The present study uses 13 years of prospective data on a large, diverse civilian population of older adult members of an integrated health care delivery system (n = 499,844) in Northern California. Our primary objective was to examine the association between PTSD and risk of dementia among both older male and female members. Because PTSD and dementia are associated with other medical conditions, we also explored whether the association might be explained by vascular risk factors, depression, and TBI.

2. Methods

2.1. Study population

The study population consists of members (aged 60+ years) from the Kaiser Permanente Northern California (KPNC) health system, which is a large, integrated health care delivery system that provides comprehensive medical care to over 3.9 million members in Northern California (approximately 30% of the geographic region). This includes 16% of members enrolled in Medicare and 8% enrolled in the California Medical Assistance Program (Medi-Cal) or other state subsidized health insurance program. Past research has shown that the KPNC member population is generally representative of the overall regional population, with regards to history of chronic conditions and lifestyle factors, but may underrepresent individuals at the very extreme tails of the income distribution [22,23].

2.2. Study design

The present study includes KPNC members who were enrolled as of January 1, 1996 (date when electronic medical records were implemented). To ensure dementia diagnoses detected were incident cases, anyone with a dementia diagnosis between January 1, 1996 and December 31, 2001 was omitted from the sample. Fig. 1 provides an overview of the study flow. The present analyses include members who were still alive, KPNC members, and had no dementia diagnosis as of January 1, 2002. Cohort members were followed for incident dementia until a lapse in health plan membership (defined as a gap in health plan coverage of $\geq$3 months), death, or December 31, 2014 (end of study period). The Kaiser Division of Research Internal Ethics Committee approved study procedures.

2.3. Measures

Dementia diagnoses were identified from electronic medical records. Diagnoses were from inpatient and outpatient visits between January 1, 2002 and December 31, 2014 based on International Classification of Diseases, Ninth Revision (ICD-9) diagnosis codes for Alzheimer's disease (331.0), vascular dementia (290.4x), and other nonspecific dementia (290.0x, 290.1x, 290.2x, 290.3x, 294.1x, 294.2x). PTSD diagnoses were determined from electronic medical records, which include diagnoses from all inpatient and outpatient encounters at KPNC. PTSD was coded using ICD-9 code 309.81, which was based on a physician's diagnosis between January 1, 1996 and December 31, 2001.

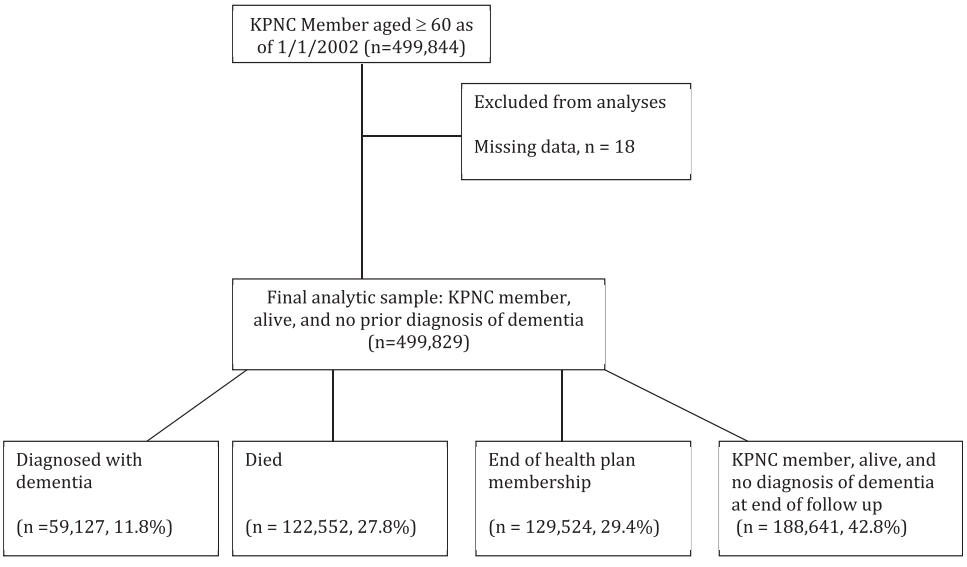

Fig. 1. Flow chart of study participants. Abbreviation: KPNC, Kaiser Permanente Northern California.