



REVIEW ARTICLE

Parkinson's disease and Alzheimer disease: environmental risk factors^{☆,☆☆}

J. Campdelacreu

Servicio de Neurología, Hospital Universitari de Bellvitge, L'Hospitalet de Llobregat, Spain

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Interaction

Abstract

Introduction: The purpose of this review is to update and summarise available evidence on environmental risk factors that have been associated with risk of Parkinson's disease (PD) or Alzheimer disease (AD) and to discuss their potential mechanisms.

Development: Evidence consistently suggests that a higher risk of PD is associated with pesticides and that a higher risk of AD is associated with pesticides, hypertension and high cholesterol levels in middle age, hyperhomocysteinaemia, smoking, traumatic brain injury and depression. There is weak evidence suggesting that higher risk of PD is associated with high milk consumption in men, high iron intake, chronic anaemia and traumatic brain injury. Weak evidence also suggests that a higher risk of AD is associated with high aluminium intake through drinking water, excessive exposure to electromagnetic fields from electrical grids, DM and hyperinsulinaemia, obesity in middle age, excessive alcohol consumption and chronic anaemia. Evidence consistently suggests that a lower risk of PD is associated with hyperuricaemia, tobacco and coffee use, while a lower risk of AD is associated with moderate alcohol consumption, physical exercise, perimenopausal hormone replacement therapy and good cognitive reserve. Weak evidence suggests that lower risk of PD is associated with increased vitamin E intake, alcohol, tea, NSAIDs, and vigorous physical exercise, and that lower risk of AD is associated with the Mediterranean diet, coffee and habitual NSAID consumption.

Conclusions: Several environmental factors contribute significantly to risk of PD and AD. Some may already be active in the early stages of life, and some may interact with other genetic factors. Population-based strategies to modify such factors could potentially result in fewer cases of PD or AD.

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E-mail address: 33357jcf@Comb.Cat

PALABRAS CLAVE

Factores de riesgo ambientales;
Factores protectores;
Tóxicos ambientales;
Enfermedad de Parkinson;
Enfermedad de Alzheimer;
Interacción

Enfermedad de Parkinson y enfermedad de Alzheimer: factores de riesgo ambientales**Resumen**

Introducción: Esta revisión pretende actualizar y resumir la evidencia disponible sobre los factores de riesgo ambientales que se han asociado a riesgo de enfermedad de Parkinson (EP) o de Alzheimer (EA) y discutir sus posibles mecanismos.

Desarrollo: Hay evidencia consistente de mayor riesgo de EP asociado a pesticidas y de mayor riesgo de EA asociado a pesticidas, hipertensión y colesterol en edad media, hiperhomocisteinemia, tabaco, traumatismo craneoencefálico grave y depresión. Hay evidencia débil de mayor riesgo de EP asociado a consumo elevado de leche en hombres, ingesta alta de hierro, anemia crónica y traumatismo craneoencefálico grave, y de mayor riesgo de EA asociado a ingesta elevada de aluminio en agua potable, alta exposición a redes eléctricas, DM e hiperinsulinemia, obesidad en edad media, consumo excesivo de alcohol y anaemia crónica. Hay evidencia consistente de menor riesgo de EP asociado a hiperuricemia, tabaco y café, y de menor riesgo de EA asociado a consumo moderado de alcohol, ejercicio físico, terapia hormonal sustitutiva perimenopáusica y buena reserva cognitiva; hay evidencia débil de menor riesgo de EP asociado a mayor consumo de vitamina E, alcohol, té y AINE y a ejercicio físico vigoroso, y de menor riesgo de EA asociado a dieta mediterránea, café y consumo crónico de AINE.

Conclusiones: Diversos factores ambientales contribuyen significativamente al riesgo de EP y EA. Algunos de ellos podrían actuar ya desde etapas tempranas de la vida o interactuar con otros factores genéticos. Estrategias poblacionales de modificación de estos factores podrían potencialmente evitar algunos casos de EP o de EA.

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Introduction

The most common neurodegenerative diseases are Parkinson's disease (PD) and Alzheimer disease (AD). A small percentage of cases develop due to known genetic mutations, and discovering these variants is contributing to our knowledge of the pathophysiology of PD and AD. However, the vast majority of cases are attributed to the action and interaction of a host of genetic and environmental influences acting as susceptibility factors or triggers. Numerous epidemiological studies have linked different environmental factors to lower or higher levels of risk for these diseases. These studies are very heterogeneous and results have been more or less consistent depending on the factor examined and on study design. The purpose of this article is to review the risk factors linked to PD and AD and their potential pathophysiological mechanisms, and to present a summary of available evidence collected through a Medline literature search of systematic reviews and meta-analyses of the most significant epidemiological studies published in the past 10 years. The main risk factors for PD and AD are listed in [Table 1](#).

Procedure**Pesticides**

Interest in the link between pesticides and PD was awakened in the 1980s when parkinsonism was observed among users of a synthetic opioid bearing traces of MPTP. Pesticides destroy dopaminergic (DA) neurons, which is why they are used in animal models of PD.¹ Some case-control studies

Table 1 Most important risk factors for PD and AD

	PD	AD
Increased risk, robust evidence	Pesticides	Pesticides AHT (middle age) Cholesterol (middle age) Hyperhomocysteinaemia Tobacco Severe head trauma
Increased risk, weak evidence	Milk (men) High iron intake Chronic anaemia	Aluminium (drinking water) EM fields (electric lines) DM and hyperinsulinaemia Obesity (middle age) Alcohol (excessive) Chronic anaemia
Reduced risk, robust evidence	Hyperuricaemia Tobacco Coffee	Alcohol (moderate) Physical exercise HRT (perimenopausal) Cognitive reserve
Reduced risk, weak evidence	Vitamin E Alcohol Tea Vigorous physical exercise NSAID	Mediterranean diet Coffee NSAID

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