1. Introduction

In 2015, dementia cost the United States of America alone $226 billion, and by 2050, this cost is projected to rise to $1.1 trillion (1). An often underappreciated cost of dementia is the impact upon informal caregivers for dementia patients. Dementia caregiving is associated with heightened stress as well as increased depression (2). There is also emerging evidence that the chronic stress of caregiving may impact upon central nervous system activity in informal caregivers (3); this may exacerbate the physiological effects of ageing (see Figure 1). The current study examined the cognitive neurobiology and mental well-being of dementia caregivers.

2. Aims & Hypothesis

Aims: (1) Systematically evaluate the literature for the effects of dementia caregiving on biomarkers of stress, including HPA axis activity, inflammation and cognitive performance. (2) Examine stress, depression and cognitive performance in an Irish cohort of dementia caregivers.

Hypotheses: We hypothesised that dementia caregiving would be associated with heightened biomarkers of stress and worsened mental health.

3. Methods

Systematic review

Systematic review: We searched PsychINFO, ScienceDirect, Web of Knowledge, PubMed, Scopus and Cinahl for quantitative studies published in English that examined biomarkers of stress in dementia caregivers. Studies were assessed for inclusion in the systematic review (see Figure 2 for flowchart of study evaluation). We examined studies assessing biomarkers of stress in dementia caregivers, as well as interventions to reduce stress biomarkers. The systematic review was registered on 28/05/2015 at the following link: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015020828

Caregiver assessment

Family dementia caregivers (N = 30) were recruited via the Memory Clinic at St. Finbarr’s Hospital, Cork. Caregivers were providing at least 10 hours of unpaid care per week to a relative with dementia. Controls (N = 12) were recruited from the community.

Exclusion criteria were: serious health problems, taking a medication that would confound the aims of the study, participation in a trial involving experimental drugs in the last 30 days.

Daily stress: Daily stress was assessed using the Cohen Perceived Stress Scale. Depression was assessed using the Beck Depression Inventory (BDI).

Neurocognitive performance: Participants completed the paired associates learning task (PAL), simple reaction time, spatial span and rapid visual information processing tests, from the CANTAB platform (see Figure 3).

Table 1: Participant characteristics (Values are mean +/- SEM).

<table>
<thead>
<tr>
<th></th>
<th>Caregivers (N = 30)</th>
<th>Controls (N = 12)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>56.1 +/- 2.7</td>
<td>52.9 +/- 2.3</td>
<td>.36</td>
</tr>
<tr>
<td>Gender</td>
<td>20 females, 10 males</td>
<td>7 females, 5 males</td>
<td>.73</td>
</tr>
<tr>
<td>Relation to care recipient</td>
<td>20 children, 10 spouses</td>
<td>10 children, 5 spouses</td>
<td>.17</td>
</tr>
<tr>
<td>IQ (NART)</td>
<td>105 +/- 1.8</td>
<td>104.3 +/- 2.6</td>
<td>.78</td>
</tr>
</tbody>
</table>

4. Results

Stress and mental health in caregivers

Dementia caregivers reported significantly higher stress than non-caregivers, F(1, 35) = 5.69, p = .02, η² = .14 (see Figure 4).

Depression

Dementia caregivers reported higher depression than non-caregivers, a marginally significant effect, F(1, 32) = 3.72, p = .06, η² = .11 (see Figure 5).

Neurocognition

Visuospatial Memory

Caregivers made significantly more errors on the Paired Associates Learning (PAL) test, 8 patterns: F(1, 37) = 5.18, p = .03, η² = .12 (see Figure 6).

Working memory

Caregivers and controls did not differ in spatial span performance (see Figure 8).

Simple reaction time

Caregivers did not differ from controls on simple reaction time (see Figure 9).

5. Discussion & conclusions

- Dementia caregiving is associated with heightened cortisol levels and high self-reported stress levels, as well as poorer performance on tests of memory and sustained attention. This likely interacts with higher levels of depressive symptoms and may underpin a possible cognitive neurobiology of caregiving.
- A comprehensive physiological phenotyping of dementia caregivers is required to better understand the mechanisms of these effects.

6. Acknowledgements & Disclosure

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7. References