The Hellenic Longitudinal Investigation of Aging and Diet (HELIAD): study description and preliminary data

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The Hellenic Longitudinal Investigation of Aging and Diet (HELIAD) is a population-based, multidisciplinary, collaborative study designed to estimate, in the Greek population over the age of 65 years, prevalence and incidence of mild cognitive impairment, Alzheimer’s Disease, other forms of dementia and other neuropsychiatric conditions of aging and to investigate associations between nutrition and cognitive dysfunction or age-related neuropsychiatric diseases.

The study also ascertains several demographic, medical, social, environmental, clinical, nutritional and neuropsychological determinants and lifestyle activities. We here present the design of the HELIAD and highlight the main baseline characteristics of the first 1,943 participants who completed the initial evaluation. We also present preliminary data regarding dementia prevalence in Greece.
The global impact of dementia

Around the world, there will be 9.9 million new cases of dementia in 2015, one every 3 seconds.

46.6 million people worldwide are living with dementia in 2015. This number will almost double every 20 years.

68% in 2050

Much of the increase will take place in low and middle income countries (LMICs). In 2015, 58% of all people with dementia live in LMICs, rising to 83% in 2030 and 88% in 2050.

The total estimated worldwide cost of dementia in 2015 is US$ 818 billion. By 2030, dementia will become a trillion dollar disease, rising to US$ 2 trillion by 2030.

If global dementia care were a country, it would be the 18th largest economy in the world exceeding the market values of companies such as Apple and Google.

Source: Forbes 2016 ranking.

This map shows the estimated number of people living with dementia in each world region in 2015.
Ministerial Conference on Dementia
WHO  Geneva 16 -17 March 2015

RESEARCH

Actions that aim to: increase research, or improve the quality of research into dementia related subjects. Including but not limited to:

World Dementia Council

globaldementiaworkshops.wordpress.com
Dementia in Greece

• 200,000 people with dementia
  89% cared for at home - 400,000 caregivers

• Dementia the most pressing medical, social and economic challenge

• Annual cost of dementia in Greece 6 billion euros

• 33 Alzheimer’s Associations
  (awareness campaigns, screening programs, programmes for carers, Memory Clinics, non pharmacological interventions, seminars for health professionals, scientific research)

• Few services operated by Alzheimer’s Associations and funded by the State or European Union

2015: National Action Plan for Dementia and Alzheimer’s Disease
Alzheimer’s disease: a rapidly growing epidemic

- **Non-modifiable risk factors: age, genes**
  - Deterministic genes: PS-1, PS-2, APP
  - Risk genes:
    - ApoE4 (Chr. 19)
    - CR1, PICALM, CLU,
      Common variants at
      ABCA7,
      MS4A6A/MS4A4E,
      EPHA1, CD33 and
      CD2AP, TREM2

- **Modifiable risk factors**: vascular risk factors, diet, lifestyle, mental-physical exercise
  **Prevention**!
- Significant evidence supporting the benefits of early diagnostic evaluation, treatment and social support
- There is an urgent need for **effective treatments** as well as **preventive strategies**.
Importance of investigating the prevalence of dementia

- Calculation of cost care
- Establishment of guidelines for public health services
- Clarification of risk factors
- Clarification of protective factors

Recent studies show that dementia incidence has declined over the last decades (USA, Netherlands, Denmark, UK)

**Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability**

A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomized controlled trial

*The Lancet* March 2015
Protective factors

- Mediterranean Diet
- Active lifestyle
- Physical – Mental exercise
- Socialisation

Cognitive reserve!

Scarmeas et al, 2010
Dementia Prevention

European Dementia Prevention Initiative

- FINGER: Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability
- preDIVA: Prevention of Dementia by Intensive Vascular Care
- MAPT: Multidomain Alzheimer Preventive Trial

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Method

- The study is conducted in **Larissa**, Thessaly from 2009 and in **Maroussi**, Athens from 2013.
- Community-dwelling individuals have been selected to participate in the study through random sampling from municipality registries.
- The study is prospective in design with planned reevaluation every 3 years.
- All procedures were approved by the Institutional Ethics Review Board of the University of Thessaly and the University of Athens.
- Sessions take place at day care centers for the elderly, the participants’ homes or municipal public health clinics.
- Neurologists carry out a complete and structured neurological evaluation. Trained psychometricians administer a complete battery of neuropsychological tests assessing all major cognitive domains. Dietary intake is evaluated through a semi qualitative Food Frequency Questionnaire (FFQ) developed and validated for the Greek population.
- Nonfasting blood samples are collected and stored.
- The initial evaluation was completed during a single visit, which lasted about 2–2.5 h per participant.
Supplementary methods

- Physical - neurological examination
- Neuropsychological assessment
- Neuropsychiatric assessment
- Demographics
- Medical and family history
- Leisure activities and social networks
- Functional performance and physical activities
- Sleep assessment
- Self – reported memory problems
- Nutritional Assessment and Malnutrition screening
- Biological Specimens

Consensus diagnosis
In total, 1943 participants have already completed the initial evaluation and 520 have been reassessed after an average of 3 years. According to data analyses from the first subgroup of 1792 participants, they were on average 73.4±6.0 years old, 60% of the sample were females, while most of the participants were poorly educated with an average of 5.41±3.5 years of education.

- Sex: 60.3% women
- Mean Age: 72.92±5.784 (65 – 93) years
- Mean duration of education: 7.96±4.9 (minimum 0 - maximum 30)
- Illiterate population: 5.4%
- Mean score for MMSE: 26.87±3.19
- Married: 74.1%
## Demographic data between groups

<table>
<thead>
<tr>
<th></th>
<th>City</th>
<th>Mean/%</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex (female )</strong></td>
<td>Maroussi</td>
<td>64,70%</td>
<td>* .031</td>
</tr>
<tr>
<td></td>
<td>Larissa</td>
<td>58,80%</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td>Maroussi</td>
<td>71,42±7,04</td>
<td>* .003</td>
</tr>
<tr>
<td></td>
<td>Larissa</td>
<td>73,39±5,58</td>
<td></td>
</tr>
<tr>
<td><strong>Education (years)</strong></td>
<td>Maroussi</td>
<td>12,42±4,41</td>
<td>* .000</td>
</tr>
<tr>
<td></td>
<td>Larissa</td>
<td>6,34±4,08</td>
<td></td>
</tr>
<tr>
<td><strong>Mini Mental State</strong></td>
<td>Maroussi</td>
<td>27,58±3,21</td>
<td>* .001</td>
</tr>
<tr>
<td><strong>Examination (MMSE)</strong></td>
<td>Larissa</td>
<td>26,58±3,10</td>
<td></td>
</tr>
</tbody>
</table>

### Medical conditions

- Hypertension: 62,5%
- Dyslipidemia: 39,8%
- Diabetes mellitus: 16,9%
- Coronary heart disease: 10,3%
- Myocardial infarction: 3,0%
- Congestive heart failure: 1,6%
- Arrhythmia: 10,3%
- Chronic obstructive pulmonary disease/other pulmonary disease: 6,7%
- Thyroid disease: 12,7%
  - Hyperthyroidism: 1,8%
  - Hypothyroidism: 11,0%
- Liver disease: 0,4%
- Renal insufficiency: 0,1%
- Peptic ulcer disease: 3,5%
- Peripheral vascular disease: 2,6%
- Cancer: 5,2%
- Arthritis: 9,8%
- Traumatic brain injury: 10,8%
- Seizures: 0,7%
- Parkinson’s disease: 1,4%
- Multiple sclerosis: 0,1%
- Vitamin B12 deficiency: 0,4%
- Normal pressure hydrocephalus: 0,1%
OCCUPATIONS

- Housewife: 26.7%
- Farmer: 9.4%
- Feeder: 1%
- Worker: 14.5%
- Craftsman: 6.8%
- Freelancer: 13%
- Public servant in office: 8.5%
- Public servant - worker: 2.3%
- Work in a private office: 5.6%
- Instructor: 3.6%
- Manager: 1.3%
- Other: 7.9%
# Subjective Memory Complaints

## Complaints

<table>
<thead>
<tr>
<th>Complaint</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No difficulty remembering names</td>
<td>88.4%</td>
</tr>
<tr>
<td>No difficulty in remembering things just read or heard</td>
<td>77.9%</td>
</tr>
<tr>
<td>Problems go shopping because of memory loss</td>
<td>94.8%</td>
</tr>
<tr>
<td>Problems to get chores done around the house because of memory loss</td>
<td>95.3%</td>
</tr>
<tr>
<td>Difficulty in remembering the right word in a speech</td>
<td>73.6%</td>
</tr>
</tbody>
</table>

### Person that first noticed symptoms of loss of memory

<table>
<thead>
<tr>
<th>Person</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td></td>
</tr>
<tr>
<td>Children</td>
<td></td>
</tr>
<tr>
<td>Husband/wife</td>
<td>51.2%</td>
</tr>
<tr>
<td>Him/herself</td>
<td>48.8%</td>
</tr>
</tbody>
</table>
## Prevalence/ age

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>65-69 (n=470)</th>
<th>70-74 (n=614)</th>
<th>75-79 (n=455)</th>
<th>80-84 (n=191)</th>
<th>85+ (n=62)</th>
<th>Total sample (n=1792)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No dementia</td>
<td>89.3</td>
<td>88.3</td>
<td>76.0</td>
<td>70.2</td>
<td>67.7</td>
<td>82.8</td>
</tr>
<tr>
<td>MCI</td>
<td>9.8</td>
<td>9.4</td>
<td>16.7</td>
<td>15.2</td>
<td>16.1</td>
<td>12.2</td>
</tr>
<tr>
<td>Dementia</td>
<td>0.9</td>
<td>2.3</td>
<td>7.3</td>
<td>14.7</td>
<td>16.1</td>
<td>5.0</td>
</tr>
<tr>
<td>Dementia AD*</td>
<td>0.6</td>
<td>1.8</td>
<td>4.8</td>
<td>11.5</td>
<td>14.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Dementia Vascular</td>
<td>0</td>
<td>0.3</td>
<td>0.7</td>
<td>1.6</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td>Dementia alcohol</td>
<td>0</td>
<td>0.2</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Dementia FTD</td>
<td>0.2</td>
<td>0.2</td>
<td>0</td>
<td>3.1</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>Dementia PD-LBD</td>
<td>0</td>
<td>0</td>
<td>1.1</td>
<td>1.0</td>
<td>1.6</td>
<td>0.4</td>
</tr>
<tr>
<td>Dementia other</td>
<td>0</td>
<td>0</td>
<td>0.7</td>
<td>0</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>AD comorbidity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AD pure</td>
<td>0.4</td>
<td>1.0</td>
<td>2.9</td>
<td>8.9</td>
<td>12.9</td>
<td>2.6</td>
</tr>
<tr>
<td>AD + vascular</td>
<td>0</td>
<td>0.2</td>
<td>0</td>
<td>0.5</td>
<td>0</td>
<td>0.1</td>
</tr>
<tr>
<td>AD + depression/anxiety</td>
<td>0</td>
<td>0.5</td>
<td>1.3</td>
<td>0.5</td>
<td>1.6</td>
<td>0.6</td>
</tr>
<tr>
<td>AD other single etiology</td>
<td>0</td>
<td>0</td>
<td>0.2</td>
<td>1.6</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>AD multiple etiologies</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0</td>
<td>0</td>
<td>0.2</td>
</tr>
<tr>
<td>Dementia non-AD</td>
<td>0.2</td>
<td>0.5</td>
<td>2.4</td>
<td>3.1</td>
<td>1.6</td>
<td>0</td>
</tr>
<tr>
<td>Male/female with dementia</td>
<td>30.3/69.7</td>
<td>40.7/59.3</td>
<td>48.0/52.0</td>
<td>52.7/47.3</td>
<td>49.2/50.8</td>
<td>41.4/58.6</td>
</tr>
</tbody>
</table>

*AD=Alzheimer’s disease, PD=Parkinson’s disease, LBD=Lewy Body Dementia*
Conclusions

• Prevalence of dementia is approximately 6% in European populations
• Prevalence of dementia and its subtypes in Greece is similar or lower than that reported in developed countries and worldwide
• Gradual increase in prevalence every five years of age
• In Greece, population-representative large studies with recent, solid data concerning prevalence of dementia and other neuropsychiatric diseases of aging are needed in order to design prevention policies and interventions to support people with dementia and their families

Υποστηρίξτε την εφαρμογή του Εθνικού Σχεδίου Δράσης για την Άνοια - νόσο Αλτσχάιμερ
www.alzheimer-drasi.gr
Partnerships and Consensus

Member studies: Contact details & summaries

1. Sydney Memory and Ageing Study (Sydney MAS)
2. Canadian Study of Health and Aging (CSHA)
3. Chinese Longitudinal Aging Study (CLAS)
4. Etude Santé Psychologique Prévalence Risques et Traitement (ESPRIT)
5. Korean Longitudinal Study on Cognitive Aging and Dementia (KLOSCAD)
6. Monongahela Valley Independent Elders Survey (MoVES)
7. Washington Heights Inwood and Columbia Aging Project (WHICAP)
8. Personality and Total Health (PATH) Through Life Project
9. Einstein Aging Study (EAS)
10. ZARADEMP Project (ZARagoza DEMentia DEPresion Project)
11. Hong Kong Memory and Ageing Prospective Study (HK-MAPS)
12. Singapore Longitudinal Ageing Studies (SLAS I & II)
13. Tajiri Project
15. São Paulo Ageing & Health Study (SPA)
16. Hellenic Longitudinal Investigation of Aging and Diet (HELIA)
17. Salud Autonoma Study (SAS)
18. Bambui/COH of Ageing (BCSA)
19. Hisayama Study
20. Maastricht Ageing Study (MAAS)
22. Atma Jaya Cognitive & Ageing Research (ACTive Aging Research)
23. MYNAH (MYsore studies of Natal effects on Ageing and Health)
24. Leipzig Longitudinal Study of the Aged (LEILA75+)

COSMIC Studies

COSMIC (Cohort Studies of Memory in an International Consortium) aims to bring together cohort studies of cognitive ageing internationally in order to facilitate a better understanding of the determinants of cognitive ageing and neurocognitive disorders.
Perspectives

HELIAD study will provide important data regarding prevalence, incidence and risk factors of dementia and several other neuropsychiatric diseases in Greece in order to design and implement comprehensive and effective policies and strategies.
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