

## Original Article

# Exploring Dementia in Primary Health Care: Comorbidities and Diagnostic Tools

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### Abstract

**Background:** Dementia, Alzheimer’s disease and vascular dementia, are the most frequent cause of chronic cognitive decline. The purpose of the study was to explore the perspectives and the possible causal relationships between medical, environmental and socio-demographic factors and cognitive decline in Greek island population.

**Methodology:** The study population comprised 100 individuals followed up at the outpatient clinics of Salamina’s Health Center. Patients were tested with the Mini Mental State Examination and the Geriatric Depression Scale.

**Results :** Arterial hypertension was the most common disorder (71%), followed by dyslipidemia (50%) and diabetes mellitus (43%). The frequency of the coronary disease was 25% The MMSE score was positively associated with educational level and physical activity ( $p<0.05$ ). Patients with the coronary disease had higher score at GDS. A higher score at MMSE correlated with lower score at GDS ( $p<0.05$ ).

**Conclusion:** The findings of this study confirm the coexistence of cognitive disorders with depression and that both of them can be investigated early at primary health care level. The frequency of the dementia is underestimated at primary health care.

**Key words:** Dementia, Primary Health Care, elderly, comorbidity

### Introduction

One of the major public health problems of our time is the aging population. The percentage of older people is increasing along with the number of cognitive impaired persons. The dementia diseases are the most frequent causes of chronic cognitive impairment in the elderly. However, the multifactorial etiology of these diseases has not been fully elucidated (Iqbal & Grundke-Iqbal 2010).

The dementia development risk is not limited to a single period of life but is influenced by complex interactions of genetic, environmental and morbid factors over lifespan (Borenstein et

al., 2006). While the correlation between physical illness and mental disorders appear to be interactive (Mailis, 2013). The incidence of clinically overt depression in aging persons exceeds 25% among persons suffering from chronic diseases and in particular ischemic heart disease, stroke, cancer, arthritis, chronic lung diseases, Alzheimer's and Parkinson's disease.

The general practitioner must promptly recognize dementia but also be able to expect or delay disease progression (Argyriadou et al., 2001). Mild cognitive impairment may be preceded by five years of clinical onset of dementia (Eschweiler, 2010). However, a large proportion of dementia cases will never be diagnosed or

diagnosed in a late stage, because the diagnosis in Primary Health Care is based primarily on clinical suspicion. Thus the prevalence of such cases is unknown but estimated high (Rosenblatt, 2005).

In Greece, research on dementia based on self-report questionnaires in community settings is limited.

The aim of this study was to explore the perspectives and the possible causal relationships between medical, environmental and socio-demographic factors and cognitive decline in Greek island population.

### Materials and methods

Dementia disorders were searched in outpatients visiting the chronic diseases outpatient clinics of the Health Centre of Salamina for diabetes, hypertension, coronary artery diseases, chronic obstructive pulmonary disease and dyslipidaemia. The present study aimed at the investigation of the prevalence of cognitive dysfunction among chronic ill patients over 65 years and the severity of the cognitive dysfunction according to specific questionnaires score. We also studied dementia disorders in relation to demographic, social and other characteristics of the patient (smoking, personal and family history, physical activity, alcohol consumption) as well as to depressive disorders

### Study population

This was a cross-sectional study. The study included 100 patients who used to visit the three outpatient chronic diseases clinics (cardiac, diabetic, chronic diseases) operating at the Health Centre of Salamina.

Participants had to provide a written consent or, where this was not possible, a written consent was provided by their informal caregivers. The survey included patients over 65 years old with adequate vision and hearing. As for randomization, the first five patients that came in daily at the outpatients clinics of the Health Centre of Salamina. The survey was anonymous and the patients' privacy was not violated. It was explained that the results of the study will be used only for academic purposes.

### Research procedure and tools

Initially, the patients were asked to fill in a structured questionnaire with closed-type

questionnaires regarding their demographics, and their personal and family history. The patient's medical records were studied and emphasis was put on medication taken to reveal the existence of chronic diseases. This was followed by selective clinical examination that included a rough neurological examination. Then the patients were then tested with MMSE (mini mental state examination) which is a useful and widely used examination, with 69% specificity and 90% sensitivity (Folstein et al., 1975). A score below 24 points indicates cognitive decline, while 24 to 27 points indicate mild cognitive disorder. A score between 19-24 indicates moderate disturbance and 10-18 indicate serious disturbance, while, when the score is less than 10, the cognitive impairment is considered very serious. The Mini Mental State Examination (MMSE) is a screening tool for dementia.

The Geriatric Depression Scale (GDS) was also used which is designed specifically for use in the elderly, to detect depressive symptoms (Fountoulakis et al., 1999). In this scale the normal result is considered to be less or equal to 5 points. Over 5 is indicative of depressive disorder (moderate depression) and over 10 indicates severe disorder (severe depression).

These methods were chosen as they are quick, reliable, widely used as screening tests and are therefore suitable for application at primary health care level.

### Results

Women were 51%, while most of the participants were between 65-74 years old (62%). Primary school graduates were 70% of the sample and 2% of tertiary level education. Nineteen persons lived alone (Table 1). Arterial hypertension was the commonest comorbidity (71%), followed by dyslipidemia (50%) and diabetes mellitus (43%). CHD frequency reached 25% (Table 2). Other comorbidities included cancer (9%), osteoporosis (8%), thyroidopathies (15%) and renal failure (2%). Epilepsy, Parkinson Disease, Stroke and other neurological diseases were present in the 10% of the sample. Depression had been diagnosed in 7% and dementia in the 3%. Smokers were the 13% of the sample, while 48% of the participants reported some physical exercise, while 9% reported alcohol use.

**Table 1. Demographic characteristics of the sample**

<b>N=100</b>	<b>%</b>
<b>Gender</b>	
Men	48
Women	51
<b>Age groups</b>	
65-74 years old	62
75-84 years old	32
85-94 years old	3
≥95 years old	3
<b>Educational level</b>	
Illiterate	1
Primary school	69
Junior High School	17
High school	10
Tertiary level	3
<b>Living alone</b>	
Yes	19
No	81

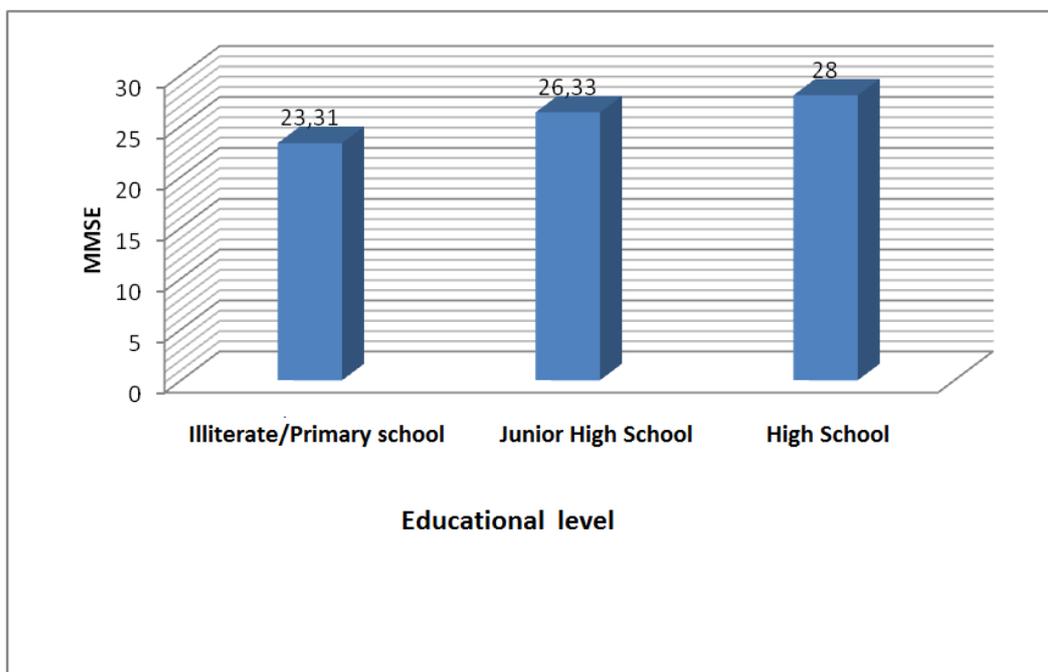
**Table 2. Distribution of the most frequent medical comorbidities**

<b>N=100</b>	<b>%</b>
<b>Arterial Hypertension</b>	
<b>Yes</b>	<b>71</b>
No	29
<b>Diabetes Mellitus</b>	
<b>Yes</b>	43
No	57
<b>Dyslipidemia</b>	
<b>Yes</b>	<b>50</b>
No	50
<b>COPD</b>	
<b>Yes</b>	12
No	88
<b>CHD</b>	
<b>Yes</b>	<b>25</b>
No	75
COPD: Chronic Obstructive Pulmonary Disease	
CHD: Coronary Heart Disease	

**Table 3. Differences in GDS and MMSE scores depending on gender and habits**

		N	GDS	p	MMSE	p
<b>Gender</b>	Men		4.25±2.46	0.265	<b>25.33±4.25</b>	<b>0.025</b>
	Women		4.84±2.78		<b>23.56±3.36</b>	
<i>Living alone</i>	Yes		5.68±4.36	0.102	23.63±4.58	0.368
	No		4.36±2.41		24.54±3.74	
<b>Physical exercise</b>	<b>Yes</b>		<b>4.04±2.21</b>	<b>0.052</b>	24.89±3.7	0.240
	<b>No</b>		<b>5.04±2.89</b>		23.90±4.03	
<b>Smoking</b>	Yes		5.00±2.73	0.529	24.76±4.30	0.730
	No		4.50±2.61		24.36±3.84	
<b>Alcohol</b>	Yes		4.87±3.60	0.748	23.62±6.84	0.733
	No		4.56±2.55		24.49±3.59	

t-test

**Fig 1. MMSE scale according to educational level**

Those with CHD had a statistically significantly higher GDS score compared with those who reported no CHD. They also had a mean value greater than 5, indicating that some depressive disorder might be present in elderly patients with CHD ( $5.52 \pm 3.25$  vs  $4.25 \pm 2.31$ ,  $p=0.036$ ). No statistically significant differences were observed in regard to other comorbidities. Demented patients had a very low MMSE score compared with the remaining participants ( $16.66 \pm 2.08$  vs  $24.65 \pm 3.61$ ,  $p < 0.001$ ). Women had a worse MMSE performance (mean score  $< 24$ ) compared with men, while living alone was associated with a higher GDS score ( $> 5$ ,  $p=0.102$ ). Participants reporting some kind of physical exercise had better scores on both scales, difference being statistically significant in the case of GDS. Of note, the mean value of those with a sedentary life was above the cut off value 5, indicating a probable depressive disorder (Table 3).

Based on the GDS, 27% showed symptoms indicative of depressive disorder, while severe depression was present in the 5%. Based on MMSE, most participants exhibited normal mental function or mild dysfunction, while 7% showed probable dementia.

Those participants with higher educational level differed statistically significantly in terms of MMSE score [  $F(4,95)=6.49$ ,  $p < 0.001$  ] from elementary graduates. Especially in the case of tertiary education, the score was above the cut off value 27, indicating an adequate mental function ( Fig 1. ). A higher MMSE score correlated statistically significantly with a lower GDS score ( Spearman's  $\rho = -0.339$ ,  $p < 0.001$  ).

## Discussion

The findings of this study confirm the coexistence of dementia and depressive disorders and suggest that both disorders can relatively easily be detected in primary health care level using appropriate tools. It was found that the prevalence of dementia tends to be underestimated in primary health care, as there is a significant discrepancy between the number of diagnosed cases and the detected with psychometric tools cases. In addition, the importance of demographic and social factors in the onset of dementia disorders is highlighted.

The prevalence of dementia is often underestimated, and it is believed to range from 1.3% at ages 60-64 to over 35% in people older than 85 years of age, with Alzheimer's disease

being the most frequent cause (Chen et al., 2009). It has been found that about 10% of the elderly suffer from dementia while 10 to 20% of the elderly suffer from depression. The annual incidence of Alzheimer's disease is estimated between 2.7% and 3.4%, while that of vascular dementia is very low, close to 0.3% (Cho et al., 2011). The prevalence of major depressive disorder in the elderly ranges from 4.2 to 9.1%, while the prevalence of clinically significant symptoms is estimated between 9.1% and 33%, with an average rate of 30-40% for dementia patients (Bayres & Yaffe, 2011). Depression and dementia coexist and a probable common pathophysiological substrate is considered (Hermida et al., 2012).

In this study, higher educational level was associated with better cognitive function. The cognitive reservoir in the brain probably explains why people with higher IQ, higher educational level or higher professional performance are at lower risk of developing dementia, either vascular dementia or Alzheimer's disease. It is believed that the mental alertness helps to establish neural connections, reducing the incidence of dementia. Regardless of neuropathological criteria, the educational level is a predictor of dementia and people with greater cognitive reservoir deal with the developing brain pathology better, even without apparent cognitive loss (Chen et al., 2009; Meng & D'Arcy 2012; Fleg, 2012).

Regarding the role of gender in dementia, it is noted that dementia is more common in women, which cannot be simply attributed to the higher life expectancy of women, but seems to be associated with hormonal systems, such as the renin-angiotensin-aldosterone system, which regulates blood pressure and its interaction with oestrogen (O'Hagan et al., 2012), but also the viability of the mitochondria of neurons, which is reduced in older women (Viña & Lloret, 2010).

Physical activity can also reduce the risk of cognitive decline in the elderly and can also improve some manifestations of dementia, such as night sleep disorder and depressive mood. Exercise may be beneficial to a wide range of dementia manifestations including anxiety and apathy. At the same time, it improves the physical functionality and it has an overall positive impact on the living standards of the elderly. Dementia patients benefit from exercise, as it improves the flow of blood and oxygen

supply to the brain, thus enhancing cognitive function and memory improvement. For this reason, exercise is an important intervention instrument for treatment of the disease. Nevertheless, more data is needed to precisely identify the benefits of the general life of the elderly (Ahlskog et al., 2011; Potter et al., 2011; Thuné-Boyle et al., 2012; Lövdén et al., 2013).

Regarding the relationship of heart disease and depression, it has been found that people suffering from depression are more likely to develop coronary artery disease. This risk occurs independently of any other risk factor for heart disease that the patient, who experiences depression, might have. Moreover, evidence show that people who suffer from depression are more likely to die from any other cause compared with similar patients without depression (Vieweg et al., 2010; Yeager et al., 2011). It is estimated roughly that 9% of heart patients show symptoms indicative of depressive assistance and 7% suffer from clinical major depression (Sowden et al., 2010). The depression and heart disease combination has been found to triple the risk of death from any cause and quadruple the risk of death from heart attack or stroke (Nabi et al., 2010). It is argued that depression promotes organic pathological changes in the body with inflammation, clotting, impaired metabolism and cellular malfunctions. Depression and cardiovascular disease act synergistically, increasing the morbidity of the one and the mortality of the other (Kent & Shapiro, 2009; Nabi et al., 2010).

Regarding the limitations of this study, the sample came from one health centre of the island region with specific socioeconomic characteristics and generalization of the results should be done cautiously.

The results of this study highlight the contribution of modifiable risk factors in the prevention of mental disorders and depression and stress the coexistence of heart disease and depression. At the same time, they point out that the prevalence of dementia disorders tends to be underestimated. The risks posed by depression in patients with heart disease and in other people who are healthy or suffering from other diseases, imperatively require the detection, diagnosis and proper treatment of the condition.

## References

Ahlskog, J.E., Geda, Y.E., Graff-Radford, N.R. & Petersen, R.C. (2011). Physical exercise as a

- preventive or disease-modifying treatment of dementia and brain aging. *Mayo Clin Proc*, 86(9):876-884.
- Argyriadou, S. Melissopoulou, H., Krania, E., Karagiannidou, A., Vlachonicolis, I., Lionis, C. (2001). Dementia and depression: two frequent disorders of the aged in primary health care in Greece. *Fam.Pract.*, 18(1) , 87-91.
- Borenstein, AR., Copenhagen ,C.I., Mortimer, J.A. (2006). Early-Life Risk Factors for Alzheimer Disease Alzheimer . *Dis Assoc Disord.*, 20, 63-72.
- Byers, A.L., Yaffe, K. (2011). Depression and risk of developing dementia. *Nat Rev Neurol*. 7(6), 323-331.
- Chen, J.H., Lin, K.P. & Chen, Y.C. (2009). Risk factors for dementia. *J Formos Med Assoc*, 108(10), 754-764.
- Cho, M.J., Lee, J.Y., Kim, B.S., Lee, H.W, Sohn, J.H. (2011). Prevalence of the major mental disorders among the Korean elderly. *J Korean Med Sci*. 26(1), 1-10.
- Eschweiler, GW. (2010). New developments in the diagnosis of dementia. *Dtsch Arztebl Int*. 107(39),667-683.
- Fleg, J.L. (2012). Aerobic exercise in the elderly: a key to successful aging. *Discov Med*, 13(70), 223-228.
- Folstein, M.F., Folstein, S.E. & McHugh, P.R. (1975). Mini-mental state. A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatry Resources*, 12 (3), 189-198.
- Fountoulakis, K.N., Tsolaki, M., Iacovides, A., Yesavage, J., O'Hara, R., Kazis, A., Ierodiaconou, C. (1999). The validation of the short form of the Geriatric Depression Scale (GDS) in Greece. *Aging (Milano)*, 11, 367-372.
- Hermida,, A.P., McDonald, W.M., Steenland, K. & Levey, A. (2012). The association between late-life depression, mild cognitive impairment and dementia: is inflammation the missing link? *Expert Rev Neurother*, 12(11), 1339-1350.
- Iqbal, K.,& Grundke-Iqbal, I (2010). Alzheimer's disease, a multifactorial disorder seeking multitherapies. *Alzheimers Dement*. 6(5):420-4
- Kent, L.K. & Shapiro, P.A. (2009). Depression and related psychological factors in heart disease. *Harv Rev Psychiatry*. 17(6):377-88.
- Lovden, M., Xu, W. & Wang, H.X. Lifestyle change and the prevention of cognitive decline and dementia: what is the evidence? *Curr Opin Psychiatry*, 26(3):239-243.
- Maillis, A. (2013). Biology and neurobiology of aging. *Contemporary Psychiatry*.
- Meng, X. & D'Arcy, C. (2012). Education and dementia in the context of the cognitive reserve hypothesis: a systematic review with meta-analyses and qualitative analyses. *PLoS One*, 7(6), e38268.
- Nabi, H., Shipley, M.J., Vahtera, J., Hall, M., Korkeila, J., Marmot, M.G., Kivimäki, M. &

- Singh-Manoux, A. (2010). Effects of depressive symptoms and coronary heart disease and their interactive associations on mortality in middle-aged adults: the Whitehall II cohort study. *Heart*, 96(20):1645-1650.
- O'Hagan, T.S., Wharton, W. & Kehoe, P.G. (2012). Interactions between oestrogen and the renin angiotensin system - potential mechanisms for gender differences in Alzheimer's disease. *Am J Neurodegener Dis*, 1(3), 266-279.
- Potter, G., Steffens, D.C. (2007). Contribution of depression to cognitive impairment and dementia in older adults. *Neurologist*, 13(3), 105-117.
- Potter, R., Ellard, D., Rees, K. & Thorogood, M. (2011). A systematic review of the effects of physical activity on physical functioning, quality of life and depression in older people with dementia. *Int J Geriatr Psychiatry*, 26(10), 1000-1011.
- Roe, C.M., Xiong, C., Miller, J.P. Morris, J.C. (2007). Education and Alzheimer disease without dementia: support for the cognitive reserve hypothesis. *Neurology*, 68(3), 223-228.
- Rosenblatt, A. (2009). The art of managing dementia in the elderly. *Cleve Clin J Med*, 72(suppl 3), 53-13.
- Sowden, G., Mastromauro, C.A., Januzzi, J.L., Fricchione, G.L. & Huffman, J.C. (2010). Detection of depression in cardiac inpatients: feasibility and results of systematic screening. *Am Heart J*, 159(5):780-787.
- Thune-Boyle, I.C., Iliffe, S., Cerga-Pashoj, A., Lowery, D., Warner, J. (2012). The effect of exercise on behavioral and psychological symptoms of dementia: towards a research agenda, 24(7):1046-1057.
- Vina J. & Lloret, A. (2010). Why women have more Alzheimer's disease than men: gender and mitochondrial toxicity of amyloid-beta peptide. *J Alzheimers Dis*, 20 (Suppl 2):S527-533.
- Yeager, K.R., Binkley, P.F., Saveanu, R.V., Golden-Kreutz, D.M., Dembe, A.E., Mehta, L.S. & Virk, S. (2011). Screening and identification of depression among patients with coronary heart disease and congestive heart failure. *Heart Fail Clin*, 7(1):69-74.