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Prevalence of Alzheimer dementia in Upper Egypt (desert areas)

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Abstract

Background: Alzheimer's disease (AD) is the commonest type of Dementia worldwide. It rapidly increases with aging especially over 70 years.

Objectives: The aims of this study are to determine the prevalence of AD in Egyptian desert areas and to identify the risk factors and presenting symptoms.

Methods: This study was carried out on desert areas Al Kharga district and Al Quseir city. All population aged 50 years and more (12,508) were included through door to door survey by seven Neuropsychiatrists. They were screened by standardized questionnaire prepared specifically. Positive cases were invited to attend Assiut Univ. Hospital where clinical evaluation, according to DSM-IV R. and necessary psychometric tests were applied.

Results: One hundred twenty-six patients with AD were diagnosed out of 12,508 people aged 50 years; yielding a prevalence of 1%. Prevalence increases with age, from 0.34% for those aged 60 ≤ 70 years to 2.9% for subjects aged 70 ≤ 80 years, and 9.74% for those aged 80 years and more. AD is more common among females than males in all ages. Eighty-five percent of diagnosed patients are of mild and moderate degrees. Hypertension (14.3%), smoking (10.3%), diabetes (8.73%), prior epilepsy (5.6%), and family history of AD (3.5%) are common risk factors. Impaired self-care (88.1%), memory loss (84.1%), impaired social judgment (77%), agnosia (58.7%), and behavioral changes (48.4%) are the most frequently encountered symptoms of AD.

Conclusion: Prevalence of AD was 1% for population aged 50 years and more, reaching 9.7 for patients aged > 80 years. Early onset AD (< 65 years) was recorded in 7.9%.

Keywords: Prevalence, Alzheimer's dementia, Desert, Egypt

Introduction

Alzheimer's disease (AD) is the most common type of dementia as it affects up to 75% of the 35 million people suffering from dementia in the world. It is a degenerative incurable progressive disease. It is mostly diagnosed in people over 65 years, but a less prevalent early onset form sometimes develops at earlier age group. The prevalence of Alzheimer's disease is doubled every 20 years [1].

A lot of data from European studies on the prevalence of AD stated that the age-standardized prevalence of AD in people aged 65 or more is 4.4% [1]. In a study performed in the USA, a representative sample of persons over 70 years reported AD prevalence of 9.7% [2]. The global prevalence of AD is estimated at 3.9% in people older than 60 years [3].

In developed countries, about one out of ten persons over 65 years of age suffers from dementia while in those older than 85 years, more than one-third have dementia [4, 5].

Comorbidities like hypertension, diabetes, smoking, dyslipidemia, and obesity have been found to potentially increase the risk of dementia. Moreover, cerebrovascular accidents, e.g., large cortical infarcts, multiple small infarcts, single strategically placed infarct, cortical changes owing to hypoperfusion, cerebral hemorrhage, vasculopathies, and white matter changes are generally precipitating factors to development of dementia [6, 7].

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There are some non-cognitive behavioral and psychiatric disturbances usually found in patients with dementia, e.g., apathy, disinhibition, sleep disturbances, agitation, aggression, psychosis, and depression [8, 9].

The aims of this study are to determine the prevalence of Alzheimer Dementia in desert areas in Egypt and to identify the most common presenting symptoms and risk factors.

Population and method

This is a cross-sectional, door to door study, among population of Upper Egypt, (Desert areas). This study involved all the population aged 50 years and older, living in these areas for at least 6 months.

Study areas

This study was carried out in Al Kharga district, New valley Governorate and AL Quseir city, Red Sea Governorate. There are three large desert areas in Egypt; Western desert, Eastern desert, and Sinai Peninsula. Only 35,000 km 2–3.5% of the total land area is cultivated and permanently settled.

Most of the country lies within the wide band of desert that stretches eastwards from African's Atlantic coast across the continent and into Southeast Asia (https://en.wikipedia.org/wiki/Geography_of_Egypt).

The first studied area, Al Kharga district, New Valley Governorate is representative for western desert in Upper Egypt and the second area is AL Quseir city, Red Sea Governorate is a representative for Eastern desert in Upper Egypt.

We noticed some criteria about population of the desert areas, e.g., dietary habits depend on dry cereals, sheep meat, and dates. More over consanguineous marriage is very common among population of those areas and life expectancy is longer than that of urban areas.

Method

This study was carried out through two stages and every stage involved three phases. Stage one from January1st 2006 up to July 31st 2008 in Al Kharga district. Stage two from July 1st 2009 to Jan. 31st 2012 in Al Qusier city. Three phases for each of the two stages include:

Phase I: Screening phase, screening of all inhabitants (aged 50 years and more) was performed by seven specialists of Neuropsychiatry using standard Arabic Questionnaire [10], and modified Mini-Mental State Examination (MMSE), to pick up suspected cases. Phases 2: Diagnostic phase, all participants who were suspected to have dementia (MMSE ≤ 23 or ≤ 21 for illiterate subjects) were invited to attend General hospital in Al Kharga or Al Quseir for case ascertainment. All suspected dementia cases were subjected to a full neuropsychiatric assessment by nine staff members of Neurology (of Assiut University Hospital) separately, psychometeric assessment through DSM IV-R, Cognitive Abilities Screening Instrument (CASI), instrumental Activities of Daily Living Scale (ADSL), Geriatric Depression Scale (GDS) for diagnosis of depression, and Hachinski ischemic score ≤ 5 indicate AD [11]. Staging of AD was done as follows: those having a score 17–21 on MMSE were considered to have mild dementia, 9–16 have moderate, and less than 9 have severe degree of dementia. Two points were added for each group in case of educated subjects [12]. Phase 3: investigatory phase; a battery of investigations, i.e., ECG, liver function test, kidney function test (blood urea and creatinine), complete blood picture, blood sugar curve, serum uric acid, thyroid function test (free T3, T4, TSH), and lipogram. CT and/or MRI of the brain were carried out for all patients.

Statistical analysis was carried out using SPSS version 16 to assess relations and comparisons.

Results

Prevalence of Alzheimer dementia (AD) was 1/1000 among population aged 50 years and more. It was slightly higher in Al Kharga district (1.03%) than Al Quseir city (0.97%), Table 1.

Prevalence of AD was higher among females (1.26%) than males (0.93%) in all age groups, Table 2.

Most cases of AD in this study are of moderate (43.7%) and mild degrees (41.3%). Severe degree of AD was higher in Al Quseir city (26.2%) than Al Kharga district (9.5%) (Table 3).

Table 4 reported the possible risk factors for AD in the studied areas.

Table 5 clarifies the order of frequency of symptoms by which AD patients commonly presented with.

It was recorded that 7.9% of total AD cases were of early onset dementia (< 65 year), and it was higher among males (9.1%) than females (7%). Late onset AD (> 65 years) was recorded in 92.1% and was higher among females (93%) than males (90.9%). Behavioral changes were recorded among 30% of AD of early onset AD (< 65 year), while it was recorded in 50% of late onset AD (> 65 years).

Discussion

Alzheimer's disease is characterized by progressive cognitive disability usually beginning with impairment of recent memories, but finally affecting all intellectual functions [13].

Prevalence of AD widely differs worldwide and increases with aging especially after the age of 65 years. Its etiology is unknown, but different risk factors including genetic predisposition play a role in the development of

Table 1 Age-specific prevalence of Alzheimer's dementia in upper Egypt, Desert area (Al Kharga and Al Quseir)

Age group	Total		Al Quseir city		Al Kharga District	
	N	Prev. %	N	Prev. %	N	Prev. %
50–< 60 years	7/6458	0.1	3/2222	0.13	4/4236	0.09
60–< 70 years	13/3765	0.34	8/1411	0.57	5/2354	0.21
70–< 80 years	49/1700	2.9	18/539	3.34	31/1161	2.67
≥ 80 years	57/585	9.74	13/163	7.97	44/422	10.4
Total	126/12508	1	42/4335	0.97	84/8173	1.03

the disease. The high frequency of consanguineous marriage and the high frequency of positive family history of AD in the studied areas, especially in Al Kharga district, may support this hypothesis.

This study revealed that the total prevalence of AD in the studied areas was 1% among population aged 50 years and more, reaching 2.9% at 70–< 80 years and 9.74% at 80 years and more. Prevalence rapidly increases after the age of 70 years in this study (8.5-fold) especially among Al-Kharga population (12-fold). It was found that prevalence of AD was higher in Al Quseir city than Al Kharga (nearly 2-fold) among all age groups (50 up to < 80 years). On the other hand, the reverse was observed after the age of 80 years. This could be explained by the higher number of centenarians among population in Al Kharga than Al Quseir city as well as the high rates of heavy metal pollution in Al Quseir city which might contribute to the higher prevalence rates among younger age groups. The role of heavy metal intoxication in development of degenerative diseases among populations in this study will be published later on as a separate entity. Similarly, [14] reported that the prevalence rates of AD also rise exponentially with age, increasing markedly after 65 years.

Harvey and colleagues [15] reported that the prevalence of dementia increases exponentially between 45 and 60 years of age. Alzheimer's disease is the most frequent diagnosis in early onset dementia followed by vascular dementia (VaD) and fronto-temporal dementia (FTD). In this study, early onset AD (50~≤ 65 years) was recorded in 7.9% of all dementia cases, and was more common among men (9.1%) than women (7%). Behavioral changes were recorded among 30% of early onset AD cases. AD of early onset (50~≤ 65 years) in this study was recorded among two brothers and one sister in one family and two brothers in another family in Al Kharga district.

Compared with other studies in Africa, Asia, the USA, and Europe, the prevalence was higher among African-American and Hispanic population living in the USA, but lower for Africans in their homelands, for reasons that remain unclear [16–18]. This different prevalence rates among different populations could be explained on the basis of different genetic susceptibility, different numbers of centenarians among various populations, and different methods of case ascertainment in different studies.

Prevalence of Alzheimer's dementia was higher among females than males in all age groups. Experimental studies in mice support the higher risk of females for AD mediated by Aβ, APP, or both. The increased synaptic degeneration and altered inflammatory response may explain the increased AD risk in females [19].

Although [2] explained this gender difference in disease prevalence on the basis of the finding that women live longer than men, the finding of male to female ratio in our study (1353/932, i.e., 1.5:1) in the age group 70 years and more did not support this opinion. However, the biologic mechanisms underlying sex difference in both prevalence and severity are not fully understood [19]. The full impact of sex as a basic biologic variable on this neurodegenerative disease remains elusive. A lot of studies suggested that gender and age are the predominant risk factors for AD [20]. On the other hand, some studies, in the USA and other countries, assumed that age appears to consistently predict AD but gender results are inconsistent [21]. This discrepant sex prevalence and severity could be explained by the suggestion

Table 2 Age and sex-specific prevalence of Alzheimer's dementia in Upper Egypt, Desert areas (AL Kharga and AL Quseir)

Age group	Total		Male		Females	
	N	Prev. %	N	Prev. %	N	Prev. %
50–< 60 years	7/6458	0.1	2/3404	0.06	5/3054	0.16
60–< 70 years	13/3765	0.34	7/2131	0.33	6/1634	0.36
70–< 80 years	49/1700	2.9	20/1020	1.96	29/680	4.26
80 years †	57/585	9.74	26/333	7.8	31/252	12.3
Total	126/12508	1	55/6888	0.93	71/5620	1.26

Table 3 Degree of Alzheimer's dementia according to MMSE scores in Upper Egypt, Desert areas (AL Kharga and AL Quseir)

Degree	Total		Al Kharga District		Al Quseir city	
	N	%	N	%	N	%
Mild	52	41.3	39	46.4	13	31
Moderate	55	43.7	37	44	18	42.8
Severe	19	15	8	9.5	11	26.2
Total	126	100	84	100	42	100

that AD pathogenesis in women may be affected by metabolic changes induced by gonadal hormones, such as estrogen, which is known to have a protective effect on the brain. Loss of estrogen after menopause could partially lead to the deficits seen in brain metabolism in mild cognitive impairment (MCI) and AD [15].

About 85% of studied AD patients are of mild and moderate degrees in this study. This could be explained by the adopted epidemiological methods, door to door survey, where specialists of neurology reached patients at their homes. Using a standardized questionnaire and application of MMSE allows picking up mild and moderate cases. AD patients in these localities did not seek medical advice except in late stages or when behavioral changes are prominent. Most of the symptoms, especially memory deficits, in these localities are attributed to the aging process.

Presence of comorbidities, e.g., diabetes, hypertension, smoking, obesity, and dyslipidemia have all been found to increase the risk of AD [7, 22]. In this study, the most common reported risk factors are in order of frequency, hypertension, family history of dementia, smoking, diabetes mellitus, and epilepsy prior to AD.

Fratiglioni and colleagues [23] stated that, based on epidemiological studies, neuroimaging methods, and neuropathology researches, three etiological hypotheses for the development of AD have been reported with moderate or strong evidences. These include genetic, vascular (hypertension, diabetes, smoking, obesity, and high total cholesterol levels) and psychosocial risk factors. The genetic factors appear more prominent in Al Kharga district study where there was a higher rate of positive family history of

Table 4 Prevalence of possible risk factors for Alzheimer's Dementia in Upper Egypt, Desert area, in order of Frequency

Risk factors	Total N = 126		AD Al Kharga N = 84		Al Quseir N = 42	
	N	%	N	%	N	%
Hypertension	18	14.3	7	8.3	11	26
Family history of dementia	17	13.5	14	16.7	3	7.1
Smoking	13	10.3	7	8.3	6	14.3
Diabetes mellitus	11	8.73	3	3.6	8	19
Epilepsy prior to dementia	7	5.6	3	3.6	4	9.5

Table 5 Neuropsychiatric profiles of patients with Alzheimer's disease in upper Egypt, Desert areas (AL Kharga and AL Quseir)

Symptom	AD patients Total N = 126		AD patients Al Kharga N = 84		AD patients Al Quseir N = 42	
	N	%	N	%	N	%
Impaired self-care	111	88.1	81	96.4	30	71.4
Memory loss	106	84.1	72	85.7	34	81
Social judgment	97	77	71	84.5	26	61.9
Agnosia	74	58.7	60	71.4	14	33.3
Behavioral changes	61	48.4	47	56	14	33.3
Personality changes	57	45.2	44	52.4	13	31
Disorientation	45	35.7	30	35.7	15	35.7
Apraxia	35	27.8	23	27.4	12	28.6
Psychotic[a] symptoms	31	24.6	19	22.6	12	28.6
Incontinence	29	23	19	22.6	10	23.8
Language difficulty	18	14.3	9	10.7	9	21.4
Gait difficulty	16	12.7	8	9.5	8	19.1

[a]Psychotic symptoms = delusion and/or hallucination

AD (13.5%) which was attributed to the high rate of consanguineous marriage (> 80%) in this closed locality. On the other hand, the vascular hypothesis is more prominent in Al Quseir study in the form of higher rate of hypertension, diabetes, and smoking.

During course of dementia, 80–90% of people with dementia had evidence of neuropsychiatric symptoms (Steinberg and colleagues 2004). Non-cognitive behavioral and psychiatric disturbances such as apathy, disinhibited behavior, and sleep disturbances are usually observed in people suffering from dementia [9]. Several studies assured that sleep disturbances were more frequent in patients with AD, and the most common sleep behavior being a tendency to confusion in early evening and wandering at night [24]. Definite symptoms such as delusions and aberrant motor behavior (ABM) were found more common in patients with AD than in those with vascular dementia [25].

This study clarified that impaired self-care, memory loss, impaired social judgment, agnosia, behavioral changes, personality changes, disorientation, apraxia, and psychotic symptoms are the most frequent features of the neuropsychiatric profile of AD patients (in order of frequency). The explanation of the differences of neuropsychiatric profile of AD in this study and other studies are related to the type of methodology where most of the studies are hospital-based studies, and most of the referred AD patients to the hospital are presented with behavioral changes.

Fischer [26] mentioned that delusions occur in approximately one-third of AD, and AD with psychosis has an increased rate of cognitive decline. Hsieh and colleagues (2008) reported delusions in 23.1% of AD cases

in nursing homes, and 28.0% of AD of outpatient department. In this study, psychotic symptoms (delusion and hallucination) were reported in about one-fourth of cases of AD (24.6%). These cases of AD having psychotic symptoms, especially positive symptoms (delusions, hallucinations, and agitation), seek early medical advice because of the stigma of these symptoms.

The study of neuropsychiatric profile of patients with dementia may have a role in differentiating different types of dementia from each other, and thus could have a role in planning treatment [27], particularly because such symptoms interfere with the quality of life of both patients and their care-givers.

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