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Prevalence of Alzheimer's Disease and Other Dementing Disorders: Sidi M'Hamed Algerian Study

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Abstract:
Background: *Dementia is one of the main causes of disability and dependence in the elderly. The aim of the study is to improve the knowledge of dementia, by establishing its prevalence in a region of Algiers and thus enrich its epidemiology aspect.*
Materials and Methods*: A cross-sectional, door-to-door study in the Department of Sidi M'Hamed in the city of Algiers "Algeria", conducted in the general population, was carried out, between June 2012 and August 2014. The screening of suspected subjects was performed with the Catherine Thomas Anterion Cognitive Complaint Questionnaire (CCQ). The clinical diagnosis of dementia was made according to the* diagnostic *and* Statistical Manual *of* Mental Disorders, 4th Edition- *Text Revision (DSM-IV-TR) criteria. Possible or probable cases of Alzheimer's disease (AD), mixed dementia (MD), vascular dementia (VaD), frontotemporal dementia (FTD), Parkinson's dementia (PD), and other dementias were identified using the standard criteria.*
Results: *Of 3896 elderly interviewed, 305 subjects had a suspicious memory complaint according to the CCQ. After neuropsychological, radiological, and biological examination, the diagnosis of dementia was established in 192 of these subjects. The prevalence of dementia in this population was 4.93% (IC95 %: 4,25 - 5,61). AD was the predominant type, with an estimated prevalence of 3.54% (IC95%: 2,96 - 4,2). Factors strongly associated with dementia were advanced age, living alone, widowhood, low cultural level, family history of dementia, high blood pressure, and stroke ($p< 10^{-6}$).*
Conclusion: *The prevalence observed in the department of Sidi M'Hamed is close to those found in high-income countries. Further, more extensive studies should be conducted in both rural and urban areas of Algeria to better define the problem and to consider comprehensive management solutions and prevention axes adapted to our context.*
Keywords: *Dementia - Prevalence - Elderly - General population - Department of Sidi M'Hamed - City of Algiers.*

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I. Introduction

Currently, the world population is aging. There are more than 967 million people aged 60 years and over living in the world [1]. The increase in life expectancy contributes to the rapid increase in these numbers and is associated with an increased prevalence of chronic diseases. The prevalence of dementia and Alzheimer's disease (AD), both age-related diseases, is therefore increasing. The latest estimates put the number of dementia cases at 52 million worldwide in 2020 [1], a figure that is expected to nearly double every 20 years. There are nearly 10 million new cases each year. One every 3 seconds. In the general population, it is estimated that between 5 and 8% of people aged 60 and over have dementia at some point.

The total number of people with dementia is expected to reach 82 million by 2030 and 152 million by 2050. This increase is largely due to the rise in the number of dementia cases in low- and middle-income countries.

The highest standardized prevalence rates of dementia in 2015, among subjects aged 60 years and older, were observed in North Africa/Middle East (8.7%) and Latin America (8.4%). In contrast, the lowest rate was observed in Central Europe (4.7%) [2]. Compared to 2009 estimates, the prevalence of dementia has increased significantly in North Africa and the Middle East (8.7% vs 5.9%).

People with dementia are high consumers of health care [3]. The costs considered include informal (family) care costs, direct medical care costs, and other associated social costs.

II. Material And Methods

A cross-sectional, door-to-door study in the Department of Sidi M'Hamed of the city of Algiers "Algeria", conducted in the general population, was carried out, between June 2012 and August 2014. . The sampling unit was all persons of nuclear or extended families aged 60 years or older in a door-to-door survey. The minimum sample size was calculated, based on a known average prevalence of dementia worldwide, estimated at 4.7% among subjects aged 60 years and older, in the 2009 World Alzheimer

Based on a prevalence p° = 0.05, a degree of precision i = 0.007 and a 1st species risk α = 5%, the calculations give a minimum size n = 3877. The sample constitution was provided to us by the national statistics office (NSO). The study being regional, the patients were drawn at random, at the level of the four communes of the department of Sidi M'Hamed: Algiers center, Sidi M'Hamed, and El Madania / El Mouradia. To ensure good representativeness by the commune, we used a 2-stage random sampling design. The proportion of people aged 60 and over in households was estimated at 16.5% in central Algiers, 15.9% in Sidi M'Hamed, and 12.1% in El Madania / El Mouradia.

A household is defined as the set of people usually occupying the same dwelling and living together: 40 households were to be surveyed in each district. The number of households to be surveyed was obtained by dividing the planned sample per commune by the number of districts in that commune. Within each district, every second household was to be surveyed. The first household in each district was to be surveyed first, alternating households until the planned number of households was completed. If the elderly were absent when the interviewers visited, or if the household was absent, the next household was to be surveyed without alternating. The number of persons per municipality, drawn at random, is shown in the following table (Cf. Table 1).

Table n°1: Distribution of the population of the department of Sidi M'Hamed in the 4 communes

Communes	Population	Area Km²	Density Number of inhabitants/Km²
Algiers Centre	75 541	3,85	19 621
Sidi M'Hamed	67 873	2,17	31 277
El Madania	40 301	2,14	18 832
El Mouradia	22 813	1, 93	11 820
Total	206 528	10,09	

Ethically, participation in the survey was voluntary after the objectives of the study had been presented to the respondent. For each subject surveyed, a written and informed consent was signed. In cases where the respondent was unable to express his/her wishes, consent was obtained from the spouse or a family member living in the same household. The study was conducted in three phases, including:

(1): A screening phase "Screening": Duration 1 and a half months.

(2): A phase of clinical diagnosis: 18 months.

(3): A phase of paraclinical investigations: 7 months.

1. Phase I: Screening phase:

During the screening phase, we used Catherine Thomas-Anterion's CCQ [4]. It is a questionnaire targeted at the clinical research of the first difficulties of AD which is interested not only in memory but also in two very frequent cognitive complaints at the beginning of the disease: spatial orientation and lack of word (anomia). An overall score ≥ 3 on the questionnaire, leads to the suspicion of a cognitive disorder or even dementia and prompts clinical, neuropsychological, and paraclinical investigations.

2. Phase II: Clinical diagnostic phase:

To complete our project, we visited the homes of subjects with a CCQ score ≥3, accompanied by a neuropsychologist. We conducted a clinical and neuropsychological assessment. For each subject, we proceeded to complete a diagnostic form, prepared specifically for this study, including:

- The subject's demographic data.
- The subject's medical and surgical history, as well as family history.
- A complete and detailed clinical history of the cognitive and psychobehavioral disorders presented by the patient, with their mode of onset and age of onset.
- A meticulous neurological examination was performed for each patient.
- A neuropsychological evaluation was also done, taking into account the level of education.

Therefore, we divided the patients into 2 groups:

-Group of patients with low educational level (EL): Patients with EL < 3.

-Medium and high educational level group: Patients with EL ≥ 3.

2-1- Neuropsychological tests performed for subjects with EL < 3 :

-The MMSE "Mini-Mental State Exam": For a global cognitive assessment. An MMSE score < 22 is considered pathological according to the 2003 GRECO (Reflection Group on Cognitive Assessments) norms as well as those of Farrag A in 1998 [5]. The 2 points for the reading and writing items of the MMSE were excluded in subjects with low educational levels, and the total score was calculated on 28 instead of 30 points; therefore, the reference threshold for a subject with suspected dementia was 21 instead of 23 points [5].

- The Nine Pictures Test (NPT-93): For an assessment of episodic memory. A delayed recall score < 8 is pathological.

-The DMS 48 (Delayed matching-to-sample): For an evaluation of visual recognition memory.

-The Digit Span Test: For an evaluation of working memory. Forward Digit Span: Norms are 7 ± 2. Reverse Digit Span: The norms are 5 ± 2.

- The FAB (Frontal Assessment Battery): For an assessment of executive functions. Due to the low educational level, only the following FAB items were assessed:

- Programming ability.
- Sensitivity to interference.
- Inhibitory control.

- Reflexive Praxis.

-The ISAACS SET Test: For an assessment of categorical verbal fluency.

2-2- Neuropsychological tests performed for subjects with EL ≥3:

- The MMSE: For a global cognitive assessment. According to the 2003 Greco norms, the cut-off is set at 23 for subjects with a primary school certificate and 26 for subjects with a secondary school level or a Bachelor's degree.

- Dubois' 5-words Test: For an evaluation of episodic memory. This test is scored out of 10. It is considered pathological if the score is less than or equal to 8.

- The DMS 48: For an evaluation of visual recognition memory.

- The Digit Span Test: For an evaluation of the working memory. Forward digit span: The norms are 7 ± 2. Reverse Digit Span Test: The norms are 5 ± 2.

- The FAB (Frontal Assessment Battery): For an evaluation of executive functions. Scored out of 18, the score is pathological if it is less than or equal to 14.

- The clock test: For an evaluation of executive functions and visual-spatial functions. The maximum total score is 7. Overall, a score below 4 is pathological.

- The Trail Making Test A (TMT A) and B (TMT B): For an evaluation of executive functions, essentially mental flexibility.

-Reflexive praxis.

- The Categorical and Lexical Verbal Fluency Test: For an evaluation of semantic memory and/or executive functions.

Both groups of patients were evaluated for autonomy using the IADL (Instrumental Activities of Daily Living) scale.

An evaluation of psychobehavioral disorders by the NPI "Neuropsychiatric Inventory" was also performed in both groups.

The diagnosis of dementia was retained in all cases according to the DSM IV-TR criteria. The diagnosis of probable and possible AD was based on the clinical criteria proposed by NINCDS-ADRDA "National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association" [6]. The diagnosis of vascular dementia was based on the criteria of the NINDS-AIREN "National Institute of Neurological Disorders and Stroke and International Association for Neuroscience" [7] and the Hachinski ischemic score [8]. Thus, a Hachinski ischemic score of 7 or more indicates vascular dementia, a score of 5 or 6 indicates mixed dementia, and a score of less than 5 indicates AD. The Rascovsky diagnostic criteria [9], as well as the Frontal Dysfunction Scale (FDS), have been used for the diagnosis of frontotemporal dementia (FTD). An FDS (frontal dysfunction scale) score ≥ 3 /4 in a patient with mild to moderate dementia is suggestive of FTD [10].The diagnosis of dementia related to Parkinson's disease was based on the 2007 "Movement Disorder Society" criteria [11]. The diagnosis of MCI was based on the 2011 National Institute on Aging and Alzheimer's Association criteria [12].

The dementia stage was estimated according to 2 scales:

- MMSE total score: In subjects with low educational levels, the studies conducted in 1998 by Farrag A [5] and in 2014 by Hamdy N El Tallawy and his team [13], on the prevalence of dementia in Egypt, assessed the stage of severity of dementia based on MMSE according to the following scores:

- Mild dementia: MMSE between 21 and 17.
- Moderate dementia: MMSE between 16 and 9.

- Severe dementia: MMSE less than 9.

On the other hand, in subjects with a medium or high level of education, the stage of dementia according to the MMSE was estimated as follows according to Bruno-Vellas [11].

- Mild dementia corresponds to an MMSE between 26 and 21.
- Moderate dementia: MMSE between 20 and 16.
- Moderately severe dementia: MMSE between 10 and 15.
- Severe dementia: MMSE between 3 and 9.
- Very severe dementia: MMSE less than 3.

- The Clinical Dementia Rating Scale (CDR).

3. Phase 3: Paraclinical investigations phase

After the clinical diagnosis phase, the patients were invited to join the Mustapha University Hospital of Algiers Centre, to perform a series of examinations including a biological assessment, a neuroradiological check-up, and a lumbar puncture. The complete biological check-up, included: A thyroid workup (TSH us, FT3, FT4) with a dosage of anti-TPO antibodies (Anti thyroperoxydases antibodies), complete blood count (CBC), vitamin B12, folic acid, and homocysteine, Blood glucose, renal assessment (urea creatinemia), VS, hepatic assessment, a blood ionogram (Natremia, Kalemia), phosphocalcic assessment, Serologies (HIV serology, and syphilitic serology). Lumbar puncture was performed with a determination of biomarkers (AB1-42, T-Tau, P-Tau) in the CSF. Neuroradiological workup included: a CT scan and/or a magnetic resonance imaging (MRI) of the brain with coronal sections performed for all patients.

4. Statistical analysis: Duration 6 months

Data entry was done in Excel. Statistical analysis of the data was performed on Epi info 7.2.0.1. The chi-square test was used to illustrate relationships or comparisons in nominal data. A P value less than 0.05 was considered significant. Comparisons were made between subjects with dementia and healthy subjects or subjects with non-demented cognitive impairment. Multivariate analysis (logistic regression) was used to investigate the existing associations between dementia and different medical, sociodemographic, and psychosocial factors.

III. Results

1. Description of the sample:

1.1. Description of the overall sample:

The screening phase took place during the period from 05/06/2012 to 20/07/2012. The total population aged 60 years and older, of the department of Sidi M'Hamed was estimated at 30,896 subjects in 2012. 3920 subjects aged 60 years and older were contacted for the study, of which 15 (0.38%) refused to participate and were excluded from the analysis.

A total of 3905 subjects residing in this department participated in this study. The sample constituted more than 12.6% of the total population aged 60 years and over in this department.

The age ranged from 60 to 105 years, on average (73.2 ± 8.4) years. The overall sample included 1409 men (36.1%) and 2496 women (63.9%). There was a clear predominance of women with a sex ratio of 0.56.

Among the 3905 subjects surveyed (8.04%), 314 subjects had a CCQ score ≥ 3 and were referred to phase II of the study.

In addition, of the 314 subjects referred to phase II of the study, 9 died before being seen by phase II study neurologists. They were 3 men and 6 women aged 80 to 103 years, with a mean age of 87 ± 6.8 years, whose CCQ score at the 1st visit ranged from 3 to 12. The mean CCQ score was not significantly different (p=0.911) depending on whether the subject was deceased or not. The average CCQ score was 8.45 ± 2.96 for the 305 subjects who had a neurological, neuropsychological, and para-clinical evaluation., and 8.44 ± 3.20 for the 9 subjects who died.

Therefore, the prevalence of dementia in the department of Sidi M'Hamed of Algiers was calculated from a representative sample of this department of 3896 subjects and not 3905.

A total of 305 subjects underwent neurological, neuropsychological, and paraclinical evaluations. Of these, 88 subjects (28.85%) (95% CI: 23.8 - 33.9) were previously followed for Alzheimer's disease.

1.2 Description of the prevalence study sample:

The analysis and calculation of the prevalence of dementia in the department of Sidi M'Hamed were estimated from a sample of 3896 subjects. Age ranged from 60 to 105 years, on average (73.15 ± 8.35) years. The sample included 1406 men (36.1%) and 2490 women (63, 9%). There was a clear predominance of women with a sex ratio of 0.56. Among men, age ranged from 60 to 101 years, with an average of 73.93 ± 8.31 years. In women, age ranged from 60 to 105 years, with a mean (72.71 ± 8.34) years. Men were statistically older ($p < 0.0001$).

1.3. Description of the sample with suspected memory complaint:

305 subjects (115 males and 190 females) with a CCQ score ≥ 3 were evaluated in phase II of the study (diagnostic phase). 62.8% of the subjects with a suspected memory complaint were female. 59.34% of the

subjects with a suspicious memory complaint were between 75 and 89 years of age (see Figure 1). The average age is 78.9 years.

Among the 305 subjects with a suspicious memory and/or behavioral complaint, who participated in phase II of the study, and who benefited from the para-clinical explorations, the diagnosis of dementia was retained in almost two-thirds of the cases: 192 cases (62.95%) (CI95%: 57.23- 68.34).

Of the 192 cases with dementia, 88 (45.83%) (95% CI: 38.8 -52.9) were already being followed for Alzheimer's disease.

Among the 192 subjects with dementia, the following were differentiated: Degenerative dementias: 146 cases (76.04%), Non-degenerative (acquired) dementia: 19 cases (9.9%), and Mixed dementia: 27 cases (14.06%).

Among the 146 cases of degenerative dementia, we find: AD: 138 cases (94.52%), FTD:4cases (2.74%) and Parkinson's disease dementia (PD):4cases (2.74%).

AD is the most frequent type of degenerative dementia in our study, including the following subtypes: AD without any other associated anomaly: 128 cases, AD with vitamin B12 deficiency: 4 cases, AD with Hashimoto's thyroiditis: 2 cases, AD with Hypothyroidism:1 case and AD with subdural hematoma: 3 cases.

VaD is the most common type of non-degenerative dementia (acquired dementia) (52.63%) (n= 10). It is subdivided into VaD by strategic infarction (Bi thalamic infarction): 2 cases (20%), VaD by multiple cortical/subcortical infarcts: 4 cases (40%), Subcortical ischemic VaD by multiple lacunae: 4 cases (40%).

Among the non-degenerative dementia cases, there were 3 cases of dementia secondary to a brain tumor, including 2 cases with large frontal meningioma, and 1case with multiple secondary cerebral localizations.

27 cases of MD were observed in our study, including 25 cases of MD without any other associated abnormality, and 2 cases of MD associated with Vitamin B12 deficiency.

In 113 cases (37.05%), the diagnosis of non-demented cognitive impairment was retained, including 91 cases of Normal cognitive aging (NCA), 15 cases of Mild cognitive impairment (MCI), and 3 cases of Mild Vascular cognitive impairment (MVCI), 4 cases of psychiatric conditions. Among the 15 cases of MCI, we find 11 cases (73.33%) of amnestic MCI multiple domains and 4 cases (26.67%) of amnesic MCI single domains.

2. Prevalence of dementia:

Excluding the 9 subjects who died while being referred to Phase II of the study, the prevalence estimate is reported on the 3896 subjects for whom all information is available. The prevalence of dementia is thus estimated at: P°= 4.93% (95%CI:4, 25 - 5, 61). The steps that were carried out for the detection of the prevalence of dementia and the classification of its subtypes are illustrated in Figure 1.The most frequent dementias are, in order of frequency: AD, MD, and VaD. Their prevalence was estimated as follows: AD: 3, 54% (CI95%: 2.96 - 4.12), MD: 0.69% (CI95%: 0.55 - 0.83), VaD: 0.26% (CI95%: 0.12 - 0.40), FTD: 0.10% (CI95%: 0.03 - 0.28), PD : 0.10% (CI95%: 0.03 - 0.28) and Medico-surgical dementia: 0.23% (CI95%: 0.10 - 0.40).

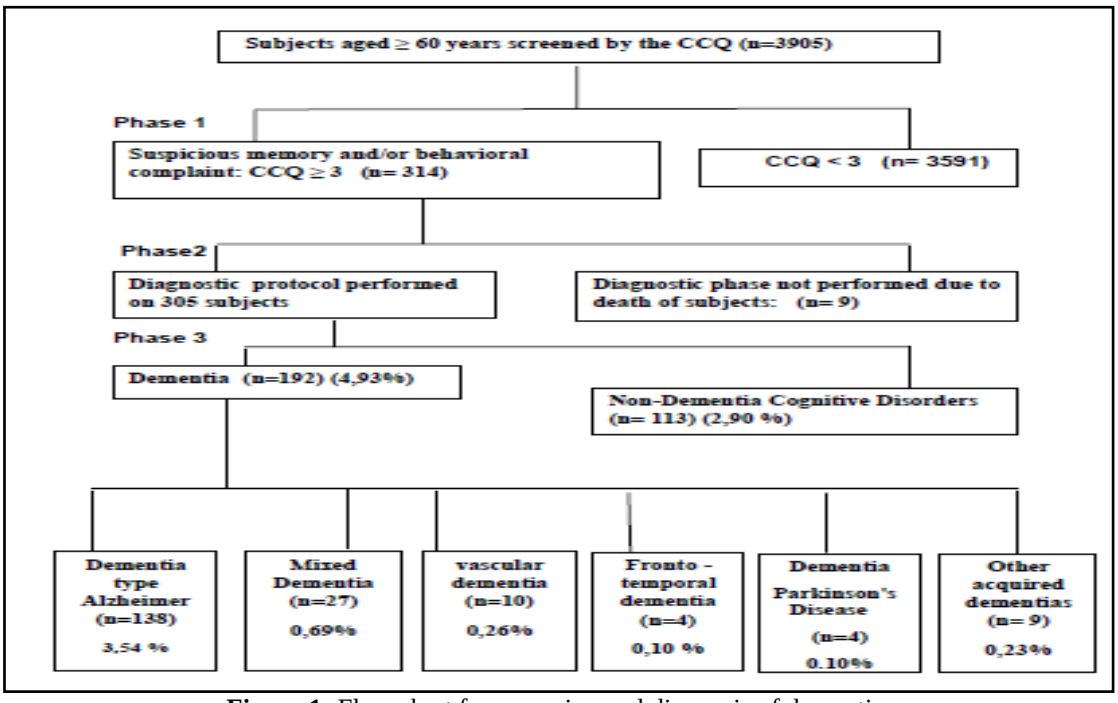

Figure 1: Flow chart for screening and diagnosis of dementia

The prevalence of dementia was estimated at 5.33% in men and 4.70% in women. It did not differ significantly by sex (p=0.674). On the other hand, the prevalence of dementia increases significantly (p<0.00001) with age in both men and women (Cf.Table 2). The estimated prevalence rate of all types of dementia recorded was 4.93% in people aged 60 years and older, 7.06% in people aged 70 years and older, and 13.04% in people aged 80 years and older.

Table 2: Overall prevalence of dementia by age and gender

The prevalence of dementia is estimated to be 6.91% in illiterate and illiterate subjects and 1.31% in educated subjects. It is significantly higher in illiterate and illiterate patients than in educated patients, both in men and women (p < 0.00001) (Cf. Table 3).

Age Years)	Total		Men		Women	
	n	%	n	%	n	%
60-79	77/3014	2,55	34 /1058	3,21	43/1956	2,2
≥80	115/882	13,04	41/348	11,78	74/534	13,86
Total	192/3896	4,93	75/1406	5,33	117/2490	4,70
P value	<0,00001		<0,00001		<0,00001	

Table 3: Overall prevalence of dementia by education and gender

Cultural Level (CL)	Total		Men		Women	
	n	%	n	%	n	%
Low CL: CL<3	174/ 2518	6,91	62 /789	7,86	112/1729	6,48
Medium / High CL: CL ≥ 3	18 /1378	1,31	13 /617	2,11	5 /761	0,66
Total	192/3896	4,93	75/1406	5,33	117/2490	4,70
P value	<0,00001		<0,00001		<0,00001	

50% of dementias are at the severe stage. AD is 51.45% in the severe dementia stage (Cf. Table 4).

Table 4: Stages of dementia and its subtypes

Stage	Total		AD n=138		MD n=27		VD n=10		Other degenerative dementias		Other acquired dementias		**P value**
	n	%	n	%	n	%	n	%	n	%	n	%	**0,068**
Mild	39	20,31	28	20,29	5	14,81	1	10			5	55.56	
Moderate	57	29,69	39	28,26	10	40,74	3	30	5	62,5			
Severe	96	50	71	51,45	12	44,45	6	60	3	37,5	4	44.44	
Total	192	100	138	100	27	100	10	100	8	100	9	100	

IV. Discussion

Our general population study first estimated the prevalence of dementia in subjects aged 60 years and older, living in the department of Sidi M'Hamed in the city of Algiers. The estimated prevalence rate of all types of dementia recorded was 4.93% in people aged 60 years and older, 7.06% in people aged 70 years and older, and 13.04% in people aged 80 years and older. The prevalence rate of dementia almost doubles every decade.

Our results are close to those recorded in some Arab countries of the Middle East, such as Egypt, where several epidemiological studies have been conducted in different cities of the country. Indeed our results are close to those recorded by El Tallawy et al in 2010 [15] in the district of Al Kharga of Egypt, having estimated the prevalence rate of dementia at 4.45% among subjects aged 60 years and over, in a sample of 8,173 subjects, and those of Farrag et al in 1998 [5], in Assiut, Egypt, who reported a prevalence rate of dementia of 4.5% in subjects aged 60 years and over in a sample of 2000 subjects.

On the other hand, our results are significantly higher than those recorded by El Tallawy et al in 2012 [13] in Al-Quseir city (urban area), Red Sea governorate, who had estimated the overall prevalence rate of dementia in subjects aged 60 years and above, to be 3, 83% in a representative sample of 4329 subjects. The lower prevalence of dementia in this study compared to the first two Egyptian studies was attributed to the fact that this study was conducted on an urban population (Al Quseir city), whereas the two previous studies were conducted on urban and rural populations. Farrag et al [5] reported that the prevalence of all types of dementia is slightly higher in rural than in urban populations, but this difference was insignificant.

In comparison with our neighboring Maghreb country "Tunisia", our results on the prevalence of dementia show higher rates. Indeed the prevalence of dementia in subjects aged 65 years and over was estimated at 3.7% in 2001 in a representative sample of the Tunisian population of 482 people [16]. In 2012, the same team estimated the prevalence of dementia at 4.6% in subjects aged 65 years and over. while in our study the prevalence of dementia in subjects aged 65 years and over was estimated at 5.82%.

The prevalence rate of dementia recorded in our study is close to the results observed in countries with a higher level of development than ours, particularly in Europe and North America, where the prevalence rates of dementia in subjects over 65 years of age are between 5% and 10% [17-19].

The prevalence rates of dementia vary in different studies around the world, where very low rates have been recorded in Kolkata, India (0.62%), among people aged 50 years and over [20]and very high rates have been recorded in Israel (19.2%) among people aged 65 years and over [21].

This geographical difference could be due to several factors, such as a different culture and environment, including relatively simple activities of daily living, a low-technology environment, and under-reported cognitive impairment by family members [22]. This discrepancy could also be explained by disparities in life expectancy at birth, which is much higher in so-called developed countries. Indeed, short life expectancy and high mortality rates in developing countries could influence the low prevalence of dementia. This is all the more plausible as the prevalence of dementia syndromes increases sharply with age. Third, a real racial difference could exist. For example, the APOE 4 allele, which is known to be a genetic risk factor for AD in Caucasians and Asians, is not associated with a higher risk of dementia in Africans [23]. However, this can also be attributed to methodological factors such as differences in sample size, the age distribution of the population, case ascertainment, screening methods, and interpretation of diagnostic criteria, which differ considerably from one study to another [5].

Concerning the different types of dementia found in our study, AD was the most frequent type of dementia (71.87%), followed by MD (14.06%), VaD (5.21%), dementia resulting from a general medical-surgical condition (4.69%) and finally degenerative dementia other than AD (4.17%). These results are completely in line with those reported in the international literature which shows that AD represents 70% of dementia cases [24-26].

In our study, the proportion of elderly people suffering from dementia among men was 5.33% and among women 4.70%. But this difference is not statistically significant ($p = 0.674$). These results are in agreement with those of El Tallawy[15] and Farrag[5], who reported a similar frequency of dementia and AD between men and women.

Indeed, several authors report a higher prevalence of dementia in women, regardless of the population of origin [27], while studies reporting an identical prevalence in both sexes are rarer [28]. This over-representation of women could be explained, on the one hand, by biological, hormonal (estrogen deficiency in the post-menopausal period) or genetic differences, or sociocultural differences such as a low level of education, but also, on the other hand, by their longer life expectancy. This finding is well known in the literature [29]. Women have an increased risk of AD, particularly after the age of 80.

The role of gender is nowadays very much debated; several epidemiological studies have shown that the female gender can only be considered a risk factor for dementia and AD after the age of 80 [17].

Also in agreement with the scientific literature, our study showed that age is a strongly discriminating factor. In our study, the prevalence rate of dementia increased significantly with age ($p < 10^{-6}$). Age is the only established risk factor in all populations studied, and also in low- and middle-income countries [30-32].

Regarding the level of education, several studies agree that a high level of education (eight years or more of schooling) is a protective factor against AD because it could increase the synaptic network associated with learning [33]. Other studies have shown that the intensity of intellectual activities is reduced in subjects with AD [34]. A low level of education (less than 8 years of schooling) is, therefore, a risk factor for this disease. This is, moreover, what our results tend to confirm insofar as 174 subjects suffering from dementia are either illiterate or illiterate.

In our study, the prevalence of dementia was indeed significantly higher in illiterate subjects than in educated subjects, estimated at 6.91% in subjects with a low level of education (EL<3) and 1.31% in subjects with a medium or high level of education (EL ≥3) (cf. Table 3).

The rates of mild, moderate, and severe dementia were estimated at 20.31%, 29.69%, and 50% respectively. Moderate and severe cases represent the largest proportion of dementia in our study, involving 79.69% of patients (Cf. Table 4). Patients with mild dementia (20.31%) are the best candidates for treatment and are most often recognizable only through population-based, door-to-door studies. Our results are not in agreement with those of the prevalence studies carried out in Egypt where mild and moderate forms of dementia were predominant. Indeed, Farrag et al [5] estimated the rates of mild, moderate, and severe dementia at 36.7%, 45.6%, and 17.8%. In 2012, El Tallawy HN et al [15]estimated, the rates of mild, moderate, and severe dementia at 53.7%, 38.4%, and 7.9% respectively. In 2014, El Tallawy HN et al [13] also reported, that the rates

of mild, moderate, and severe dementia were 33.3%, 48.3%, and 18.4% respectively; mild and moderate forms accounted for about 80% of cases.

V. Conclusion

Given the progress in health care, Algeria will be confronted with a substantial increase in the number of elderly people in the coming decades. It is, therefore, necessary to estimate the number of elderly people who may be affected by dementia to plan possible management. This study was carried out to help a better knowledge of dementia in people aged 60 years and more living in the department of Sidi M'Hamed in the city of Algiers. The epidemiological data from this study, therefore, constitute a basis for planning primary prevention activities and should encourage public authorities to consider dementia as a public health priority. However, the need for further studies in other regions of Algeria is obvious**.**

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