DEMENTIA IN ARAB WORLD

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DECLARATION OF CONFLICT INTERESET

NONE

LEARNING OBJECTIVES

- To Know that Prevalence of Dementia and their Risk Factors in Arab Countries is high.
- To know that the Number of Dementia will Increase with the Aging in this population.
- To Know how to Diagnose Dementia in Arab World.
- To Know Specificity of Neuropsychological Tests of Dementia in Arabic Language.
- To know that Prevention mesures are Essential to Reduce the Number of Dementia and Cognitive Disorders in Arab Elderly
- To Know how to Manage Dementia in Arab Context.
- To Consider Dementia as a Public Health Priority.

KEY MESSAGE

- IN ARAB COUNTRIES :
- Dementia and their Risk Factors have a high Prevalence.
- Incidence and Prevalence will Increase Dramatically with the Aging of the population.
- Diagnosis of Dementia is Challenging.
- Dementia and Cognitive Disorders are Underdiagnosed.
- Diagnosis of Dementia is usuallaty made at an Avanced Stage.
- Neuropsychological Tests adapted in Arabic are Scarce.
- There are no specific policy for Prevention and Mangement of Dementia.
- It is Urgent for Arab Countries to Consider Dementia as a Public Heal Priority.

OUTLINE

- Demention is a Public Health Priority.
- Epidemiology of Dementia and Risk Factors in Arab World.
- Diagnosis of Dementia.
- Neuropsychological Screening Tests.
- Prevention of Dementia.
- Management of Dementia.

DEMENTIA A PUBLIC HEALTH PRIORITY 1

- Dementia is a severe clinical syndrome characterized by inevitably progressive deterioration in cognitive ability and capacity for depending living.
- The number of individuals living with dementia is increasing, negatively affecting families, communities, and haelth-car system arround the world.
- The cost of dementia worldwide is $ 818 Billion.
- The majority of care is provided by family care.
- Around two third of people with dementia worldwide live in LMIC.

Prince M, Wimo A, Guerchet M et al. World Alzheimer Report 2015. ADI.

WHO. Dementia: a Public Health Priority; 2012

DEMENTIA A PUBLIC HEALTH PRIORITY 2

- In 2016, the global number of individuals who has Dementia was 43.8 million increase from 20.2 million in 1990.

- Women (27.2 Million) had more dementia than man (16.8 Million)

- Dementia was globaly the fifth leading cause of death globally, accounting for 2.4 million deaths.

Global, regional, and national burden of AD and other dementias. Lancet Neurol. 2019.

DEMENTIA A PUBLIC HEALTH PRIORITY 3

- The importance of dementia as an international issue was reinforced in 2012 when the WHO produced a report declaring dementia a 'Public Health Priority'.
- In 2017 the World Health Assembly endorsed a Global Action Plan on the Public Health response to dementia 2017-2025.
- The Global Plan aims to improve the lives of people with dementia, their families and the people who care for them.
- areas for ction include: Reducing the risk of dementia; Diagnosis, Treatment and Care; Research and Innovative technologies; and Development of Supportive Environments for Caregivers
- .

WHO. Dementia: a Public Pealth Priority

UN General Assembly. Progress on the prevention and control of non-communicable diseases. 2017

EPIDEMIOLOGY OF DEMENTIA IN ARAB WORLD 1

- Population of Arab World in 2014
- 366 million in Arab countries members of the Arab League.
- 15.7 million living in countries outside the Arab region.

- With a pourcentage of adults aged 60 years and older estimated arround 7%, and the very rapid demographic aging in the Arab countries, this population will reach 19% by 2050.

Hussein & Ismail. Ageing and Elderly Care in the Arab Region. Ageing Int. 2017

EPIDEMIOLOGY OF DEMENTIA IN ARAB WORLD 2

- One of those challenges that faces these countries is the expected rapid increase in the number of people suffering from dementia.

- This is significant because these countries lack the social and health care policies to respond to the new challenge that accompagne this demographic change.

Hussein & Ismail. Ageing and Elderly Care in the Arab Region. Ageing Int. 2017

There are few Prevalence studies regarding dementia.

El Tallawy et al.Prevalence of dementia in Al Kharga Distrect, New Valley Governorate Egypt. Neuroeoidemiology. (2012)

PREVALENCE OF DEMENTIA IN ARAB WORLD

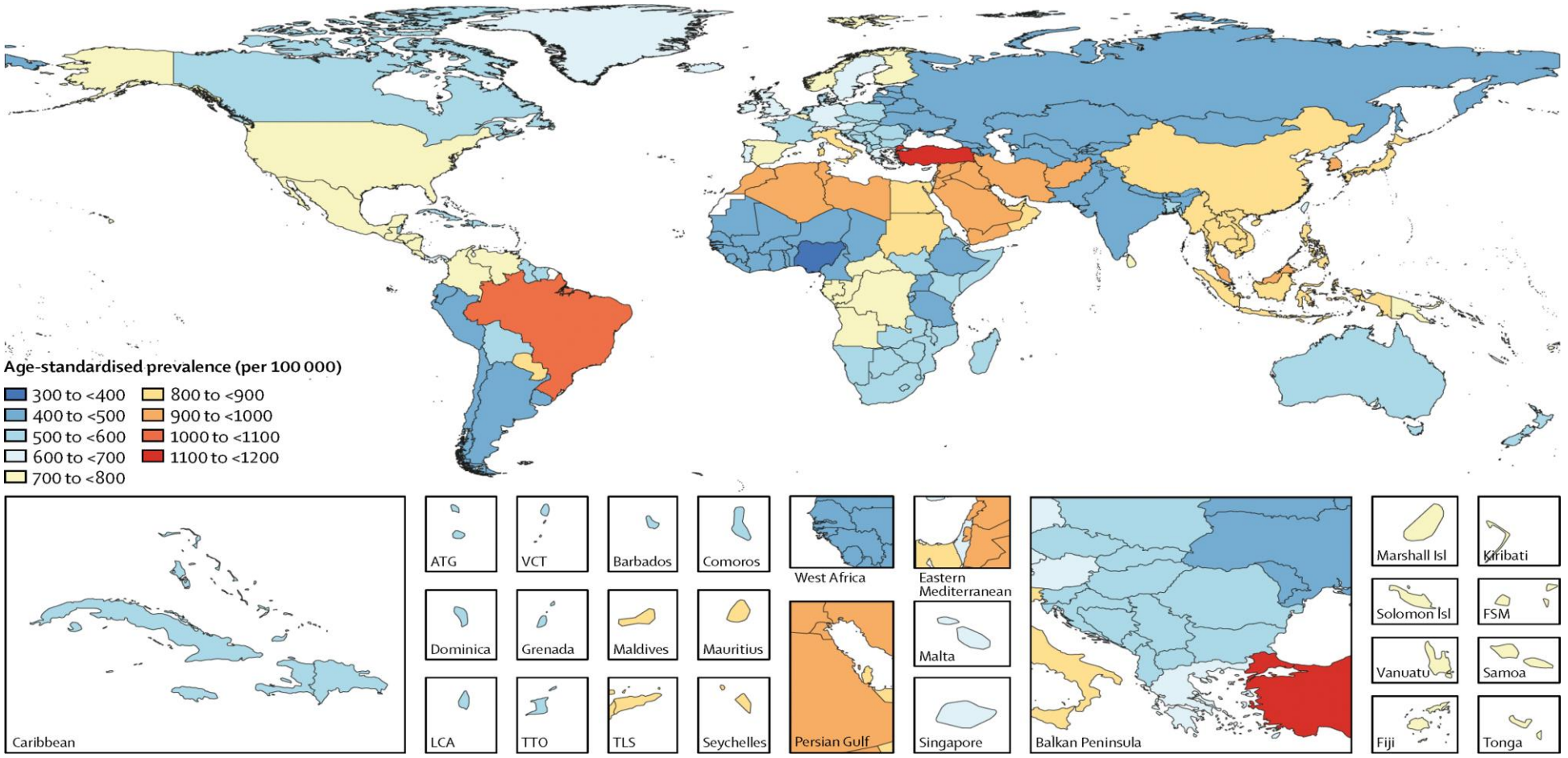
ESTIMATION OF DEMENTIA PREVALENCE IN ARAB CONTRIES IN 2016

- Age-standardardized Prevalence : ------- -----800 To 1000:100/ 000
- Number of Prevalent cases :----------1 540 478
- Number of deaths due to Dementia: ----------65 774
- DALYs (disability Adjusted Life Years): --------936 981

Global, regional, and national burden of AD and other dementias, 1990–2016. Lancet Neurol. 2019

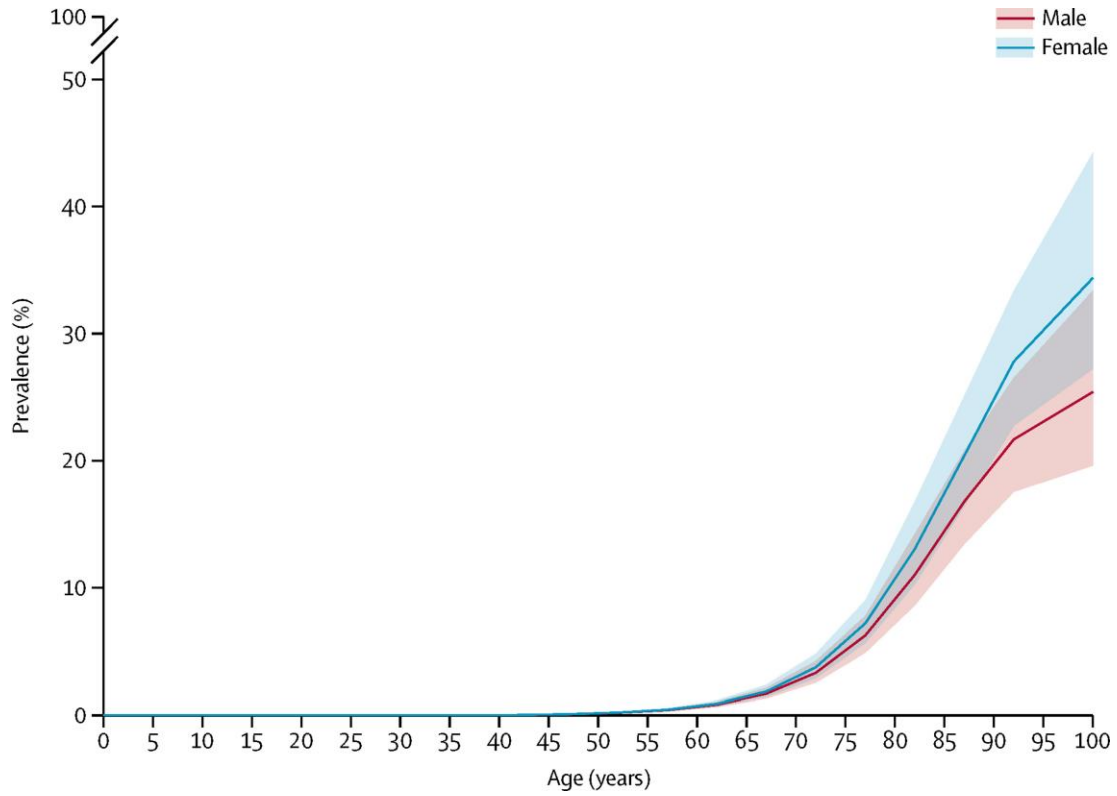
PREVALENCE OF DEMENTIA

Burden of AD and Dementia. Lancet Neurology, 2019



INCREASING PREVALENCE OF DEMENTIA WITH AGE

Burden of AD and Dementia. Lancet Neurology,2019



RISK FACTORS OF DEMENTIA

- Nine potentially modifiable Risk Factors :
- Less Childhood Education, Midlife Hearing Loss, Hypertension, and Obesity, and Laterlife Smoking, Depression, Physical Activity, Social Isolation, and Diabetes
- Account for 35% of worldwide dementia.
- Many people in Arab World cumulate numerous of these Risk Factors
- Initial targets for preventing dementia should to reduce these Risk Factors.

Mukadam et al. Population attributable fractions for risk factors for dementia in LMIC. Lancet Glob Health (2019).

UN General Assembly. Progress on the prevention and control of NCD.2017

DIAGNOSIS OF DEMENTIA IN ARAB WORLD

- Having a sufficient number of geriatricians, neurologists and neuropsychologists is a priority to diagnose and manage of Dementia in Arab countries.
- It is of great importance to train GPs to screen for cognitive impairment in older adults
- The lack of neuropsychological diagnostic tools, Low education, and stigma make the diagnostic of dementia challenging.
- The perception of cognitive disorders in traditional societies can delay the diagnostic of dementia by several years.

Hashmi : Dementia: an anthropological perspective. Int J Geriatr Psychiatry. 2009.

- Dementia in elderly Arabs are frequently under-diagnosed and often diagnosed at anadvanced stage.
- *Benabdeljlil , El Alaoui Faris et al. Dementia and AD. Experience of the Memory Center of Rabat. Eur. J. of Neurol.2015*

EARLY-ONSET DEMENTIA: MEMORY CLINICS OF RABAT.

Variable	Value
Number of patients (n, %) Male Female	218 112 (51.4%) 106 (48.6%)
Age at presentation (Mean, SD) Male Female	52 (10.11) 49 (9.88) 55 (9.47)
Time from onset to presentation (months) (Mean, SD)	28.5 (26.5)
Stage of dementia at presentation (Number, %) Mild Moderate Severe	 44 (20.2%) 133 (61%) 27 (18.8%)

NEUROPSYCHOLOGICAL TESTS IN ARAB WORLD 1

- ✓The neuropsychological testing is an important part of the evaluation of suspected cases of Dementia. Cognitive Assessment Instruments are used for detection and assessing of cognitive impairment, diagnose of dementia type, and, follow-up of deterioration progress.
- ✓There are very limited numbers of Arabic Validated neuropsychological dignostic instruments for dementia.

Azdad A, Benabdljlil, Al Zemmouri, El Alaoui Faris. Standardization and Validation of Montreal Cognitive Assessment (MoCA) in the Moroccan Population. Intern J of Brain and Cog Sciences.(2019)

Abou-Mrad et al. Sociolinguistic reflection on neuropsychological assessment: an insight into selected culturally adapted battery of Lebanese Arabic cognitive testing. Neuro Sci. 2015

NEUROPSYCHOLOGICAL TESTS IN ARABIC 2

The adaptation of neuropsychological tests in the Arab countries must take into account the linguistic specificity of Arabic:

- Arabic is a consonantal and derivational language

Kouloughli. L'Arabe. QSJ, PUF, 2007

- Arabic is written from right to left.

- The Arabic script is transparent and spelling is not used while learning to read Arabic.

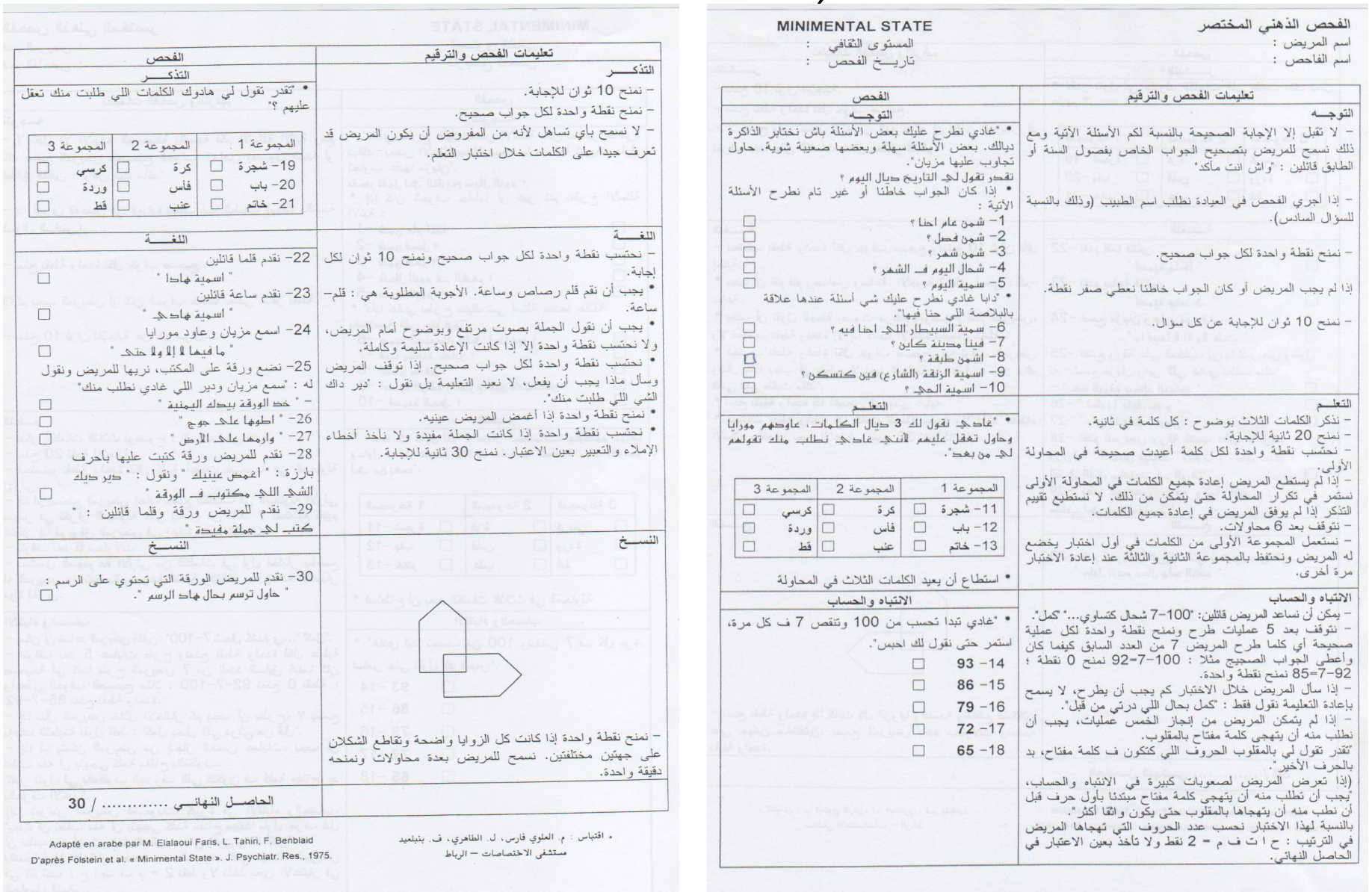
El Alaoui Faris et al. Adaptation and Validation of the minimal state examination in Arabic. Rev Neurol.2003

This makes a word spelling test in Arabic irrelevent, as in the minimal state examination (to spell back the word WORLD).

Folstein et al. Minimental state: A pratical method for grading the cognitive of patients for clinician. J Psychyat Res.1975

ARABIC ADAPTATION OF MMSE

El Alaoui Faris et al, 2003



الفحص الذهني المختصر

MINIMENTAL STATE

اسم المريض :
اسم الفاحص :
المستوى الثقافي :
تاريخ الفحص :

تعليمات الفحص والترقيم	الفحص
التوجه – لا تقبل إلا الإجابة الصحيحة بالنسبة لكم الأسئلة الآتية ومع ذلك نسمح للمريض بتصحيح الجواب الخاص بفصول السنة أو الطابق قائلين : "واش انت مأكد" – إذا أجري الفحص في العيادة نطلب اسم الطبيب (وذلك بالنسبة للسؤال السادس). – نمنح نقطة واحدة لكل جواب صحيح. إذا لم يجب المريض أو كان الجواب خاطئا نعطي صفر نقطة. – نمنح 10 ثوان للإجابة عن كل سؤال.	**التوجه** • "غادي نطرح عليك بعض الأسئلة باش نختابر الذاكرة ديالك. بعض الأسئلة سهلة وبعضها صعيبة شوية. حاول تجاوب عليها مزيان". تقدر تقول لي التاريخ ديال اليوم ؟ • إذا كان الجواب خاطئا أو غير تام نطرح الأسئلة الآتية : 1– شمن عام احنا ؟ ☐ 2– شمن فصل ؟ ☐ 3– شمن شهر ؟ ☐ 4– شحال اليوم فـ الشهر ؟ ☐ 5– سمية اليوم ؟ ☐ • "دابا غادي نطرح عليك شي أسئلة عندها علاقة بالبلاصة اللي حنا فيها". 6– سمية السبيطار اللي احنا فيه ؟ ☐ 7– فينا مدينة كاين ؟ ☐ 8– اشمن طبقة ؟ ☐ 9– اسمية الزنقة (الشارع) فين كتسكن ؟ ☐ 10– اسمية الحي ؟ ☐
التعلم – نذكر الكلمات الثلاث بوضوح : كل كلمة في ثانية. – نمنح 20 ثانية للإجابة. – نحتسب نقطة واحدة لكل كلمة أعيدت صحيحة في المحاولة الأولى. – إذا لم يستطع المريض إعادة جميع الكلمات في المحاولة الأولى نستمر في تكرار المحاولة حتى يتمكن من ذلك. لا نستطيع تقييم التذكر إذا لم يوفق المريض في إعادة جميع الكلمات. – نتوقف بعد 6 محاولات. – نستعمل المجموعة الأولى من الكلمات في أول اختبار يخضع له المريض ونحتفظ بالمجموعة الثانية والثالثة عند إعادة الاختبار مرة أخرى.	**التعلم** • "غادي نقول لك 3 ديال الكلمات، عاوديهم مورايا وحاول تحفظ عليهم لأنني غادي نطلب منك تقولهم لي من بعد". المجموعة 1 / المجموعة 2 / المجموعة 3 11– شجرة ☐ كرة ☐ كرسي ☐ 12– باب ☐ فاس ☐ وردة ☐ 13– خاتم ☐ عنب ☐ قط ☐ • استطاع أن يعيد الكلمات الثلاث في المحاولة
الانتباه والحساب – يمكن أن نساعد المريض قائلين: "100–7 شحال كتساوي..." "كمل". – نتوقف بعد 5 عمليات طرح ونمنح نقطة واحدة لكل عملية صحيحة أي كلما طرح المريض 7 من العدد السابق كيفما كان وأعطى الجواب الصحيح مثلا : 100–7–92 نمنح 0 نقطة ؛ 92–7=85 نمنح نقطة واحدة. – إذا سأل المريض خلال الاختبار كم يجب أن يطرح، لا يسمح بإعادة التعليمة نقول فقط : "كمل بحال اللي درتي من قبل". – إذا لم يتمكن المريض من إنجاز الخمس عمليات، يجب أن نطلب منه أن يتهجى كلمة مفتاح بالمقلوب. "تقدر تقول لي بالمقلوب الحروف اللي كتكون ف كلمة مفتاح، بد بالحرف الأخير". (إذا تعرض المريض لصعوبات كبيرة في الانتباه والحساب، "يجب أن نطلب منه أن يتهجى كلمة مفتاح مبتدئا بأول حرف قبل أن نطب منه أن يتهجاها بالمقلوب حتى يكون واثقا أكثر". بالنسبة لهذا الاختبار نحسب عدد الحروف التي تهجاها المريض في الترتيب : ح ا ت ف م = 2 نقط ولا تأخذ بعين الاعتبار في الحاصل النهائي.	**الانتباه والحساب** • "غادي تبدا تحسب من 100 وتنقص 7 ف كل مرة، استمر حتى نقول لك احبس". 93 –14 ☐ 86 –15 ☐ 79 –16 ☐ 72 –17 ☐ 65 –18 ☐

تعليمات الفحص والترقيم	الفحص
التذكر – نمنح 10 ثوان للإجابة. – نمنح نقطة واحدة لكل جواب صحيح. – لا نسمح بأي تساهل لأنه من المفروض أن يكون المريض قد تعرف جيدا على الكلمات خلال اختبار التعلم.	**التذكر** • "تقدر تقول لي هادوك الكلمات اللي طلبت منك تعقل عليهم ؟" المجموعة 1 / المجموعة 2 / المجموعة 3 19– شجرة ☐ كرة ☐ كرسي ☐ 20– باب ☐ فاس ☐ وردة ☐ 21– خاتم ☐ عنب ☐ قط ☐
اللغة – نحتسب نقطة واحدة لكل جواب صحيح ونمنح 10 ثوان لكل إجابة. • يجب أن نقم قلم رصاص وساعة. الأجوبة المطلوبة هي : قلم– ساعة. • يجب أن نقول الجملة بصوت مرتفع وبوضوح أمام المريض، ولا نحتسب نقطة واحدة إلا إذا كانت الإعادة سليمة وكاملة. • نحتسب نقطة واحدة لكل جواب صحيح. إذا توقف المريض وسأل ماذا يجب أن يفعل، لا نعيد التعليمة بل نقول : "دير داك الشي اللي طلبت منك". • نمنح نقطة واحدة إذا أغمض المريض عينيه. • نحتسب نقطة واحدة إذا كانت الجملة مفيدة ولا نأخذ أخطاء الإملاء والتعبير بعين الاعتبار. نمنح 30 ثانية للإجابة.	**اللغة** 22– نقدم قلما قائلين " أسمية هادا " ☐ 23– نقدم ساعة قائلين " أسمية هادي " ☐ 24– اسمع مزيان وعاود مورايا " ما فيها لا إلا ولا حتى " ☐ 25– نضع ورقة على المكتب، نريها للمريض ونقول له : "سمع مزيان ودير اللي غادي نطلب منك" – " خد الورقة بيدك اليمنية " ☐ 26– " اطويها على جوج " ☐ 27– " وارميها على الأرض " ☐ 28– نقدم للمريض ورقة كتبت عليها بأحرف بارزة : " أغمض عينيك " ونقول : " دير ديك الشي اللي مكتوب فـ الورقة " ☐ 29– نقدم للمريض ورقة وقلما قائلين : " كتب لي جملة مفيدة "
النسخ – نمنح نقطة واحدة إذا كانت كل الزوايا واضحة وتقاطع الشكلان على جهتين مختلفتين. نسمح للمريض بعدة محاولات ونمنحه دقيقة واحدة.	**النسخ** 30– نقدم للمريض الورقة التي تحتوي على الرسم : " حاول ترسم بحال هاد الرسم ". ☐
	الحاصل النهائي ..... / 30

Adapté en arabe par M. Elalaoui Faris, L. Tahiri, F. Benblaid
D'après Folstein et al. « Minimental State ». J. Psychiatr. Res., 1975.

• اقتباس : م. العلوي فارس، ل. الطاهري، ف. بنبلعيد
مستشفى الاختصاصات – الرباط

NEUROPSYCHOLOGICAL TESTS IN ARABIC 3

- From a socio-linguistic point of view, Arab speakers are in a situation of diglossia, this is mains that they use two linguistic codes:
- a dialectal (colloquial) language, particular to each country, used in intimacy and domesticity , and it does not have a specific script.
- and the Modern Arabic Standard (SMA), Arabic language common to all Arab countries.
- only the SMA a written version.
- It is used in all Arab World in Education, Administration, Television, Newspapers, Literature...

Fergusson. Diglossia. WORD.1059.

Holes . Modern Arabic: Structures, functions, and varieties. 2004

NEUROPSYCHOLOGICAL TESTS IN ARABIC 4

- Diglossia have several implications for adaptation and development of neuropsychological tests in Arabic.

- All the oral part of a test and the instructions for the patient will be in dialectal Arabic, which is specific to each country.

- the written part of the test will necessarily be in Standard Modern Arabic. that

NEUROPSYCHOLOGICAL TESTS IN ARABIC 5

- Under these conditions, a test adapted in one Arab country, must undergo some change before it can be used in another country.
- In particular, the oral part of the test and instructions for patients, must be modified according to the dialect of the second country concerned.
- Before using this version of the test, it should be standardized and validated in the target population.

El Alaoui Faris et al. Adaptation and Validation of the minimal state examination in Arabic. Rev Neurol.2003

COGNITIVE SCREENING IN ILLETERATE

- The number of illiterate or semi-literate people remains high in some Arab countries.
- Classical neuropsychological tests are not relevant in these people.
- For example, illiterate persons can lose from 5 to15 points in the MMSE without having any cognitive disorders.

El Alaoui Faris M. (2003). Adaptation and Validation of the minimal state examination in Arabic. Rev Neurol. 159,149

- Specific neuropsychological tests should be developed to assess cognitive impairment in low educated persons.

Ardila al. Illiteracy: The Neuropsychology of Cognition without Reading , Arch of Clin Neuropsychology. (2010)

Oumellal, El Alaoui Faris , Benabdeljlil et al. Population Normative Data of the Moroccan Arabic Version of Three Components of the 10/66 Dementia RG Cognitive ; with Moroccan Illiterate and Semi-Illiterate Subjects. Advanc in AD.2019

MMSE STANDARDS BY EDUCATION LEVEL IN MOROCCAN POPULATION (*El Alaoui Faris et al, 2003)*

Education (years)	Average (MMSE)	SD
0-5 years	20,70	4,69
6-9 years	26,58	2,76
10 years and over	28,10	1,93

PREVENTION OF DEMENTIA IN ARAB WORLD

- Several studies show that the improving of education and living conditions of the population.and the prevention and treatment of vascular and chronic deseases, can reduce the prevalence rate of dementia.

- This evidence suggests also that an optimum health early in life might benefit cognitive health late in life

Wu et al. The changing prevalence and incidence of dementia over time - current evidence. Nat Rev Neurol.2107

Livingston etal. Dementia Prevention, Intervention,and Care. Lancet.2017

A planned policy against dementia must act on different levels: at the primary level by tackling risk factors, at the secondary level by early detection and diagnosis of cognitive disorders and at tertiary level by treatment of dementia and caregiver suppor.

UN General Assembly. Progress on the prevention and control of non-communicable diseases. 2017

MANAGEMENT

- Raising awareness within Arab communities about dementia is an important first step in improving access of people to health services.
- Developing socially and culturally appropriate structures for the care of patients with dementia at different stages of illness should be a priority for health managers in each country.
- Several studies have shown that cognitive stimulation at the stage of MCI and at the beginning of Alzheimer's disease, can slow down the course of the disease and improve the quality of life of patients.

Aguirre et al. Cognitive stimulation for dementia: a systematic review of the evidence of effectiveness from randomised controlled trials. Ageing research reviews.2013

Taibine , El Alaoui Faris. Neurocognitive Therapy for Moroccan patients with dementia. Exerience of Alzheimer Care Day Center of Rabat. 7th Meeting of European Federation of Neuropychological Socities. Milana,2019

ALZHEIMER CARE DAY CENTER OF RABAT. MOROCCO

REFERENCES 1

- Aguirre, E., Woods, R. T., Spector, A., & Orrell, M. (2013). Cognitive stimulation for dementia: a systematic review of the evidence of effectiveness from randomised controlled trials. Ageing research reviews, 12(1), 253-262.
- Abou-Mrad F, Tarabey L, Zamrini E et al (2015). Sociolinguistic reflection on neuropsychological assessment: an insight into selected culturally adapted battery of Lebanese Arabic cognitive testing. Neuro Sci 19:239-245.
- Ardila A (2005). Cultural values underlying psychometric cognitve testing. Neuropsych Rev, 5(4):185-9.
- Ardila A, Bertolucci PH, Braga LW et al (2010).Illiteracy: The Neuropsychology of Cognition Without Reading Archives of Clinical Neuropsychology 25, 689–712
- Azdad A, M. Benabdljlil, K. Al Zemmouri, M. El Alaoui Faris(2019). Standardization and Validation of Montreal Cognitive Assessment (MoCA) in the Moroccan Population. International Journal of Brain and Cognitive Sciences, 8(1): 1-5.
- Benabdeljlil M , Boutbibe F, Rahmani M, Benbelaïd F,Bennani M, S. Aïdi, El Alaoui Faris M (2015). Dementia and Alzheimer's disease (AD). Experience of the Memory Center of Rabat. European Journal of Neurology. 22 (Suppl. 1), 484–82.

REFERENCES 2

- El Alaoui Faris M, Benabdeljlil M, Boutazout M, Mourji F, Agoulame M, Rahmani M, Berramdane M, Ait Benhaddou H, Ettahri L, Chkili T (2003). Adaptation and Validation of the minimal state examination in Arabic. Rev Neurol. 159,149.
- El Alaoui-Faris M, Benbelaid F, Alaoui C, Tahiri L, Jiddane M, Amarti A, Chkili T. Alexie sans agraphie en langue arabe: étude neurolinguistique et IRM. Revue neurologique. 1994;150(11):771-5.
- El Tallawy, HN, Farghly, WM., Shehata GA al (2012). Prevalence of dementia in Al Kharga Distrect, New Valley Governorate Egypt. Neuroepidemiology, 38 (3): 130-137.
- Fergusson C. Diglossia(1959). WORD, 15:2, 325-340
- Folstein MF, Folstein SE, McHugh PR. Minimental state: A pratical mrthod for grading the cognitive of patients for clinician.J Psychiar Res. 197512(3):189-98.
- Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016 (2019). Lancet Neurol ; 18: 88–106.
- Hashmi M (2009): Dementia: an anthropological perspective. Int J Geriatr Psychiatry, 24: 207–212.

REFERENCES 3

- Holes C (2004). Modern Arabic: Structures, functions, and varieties. Revised Edition. London: Longman
- Hussein S & Ismail M (2017). Ageing and Elderly Care in the Arab Region: Policy Challenges and Opportunities. Ageing Int 42:274–289.
- Global, regional, and national burden of Alzheimer's disease and other dementias, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016 (2019). Lancet Neurol ; 18: 88–106.
- *Kouloughli D E(2007): L'Arabe. QSJ, PUF,*
- Livingston G , Sommerlad A, Orgeta V, et al(2017). Dementia prevention, intervention, and care. Lancet. 390: 2673–734
- *Mukadam N, Sommerlad A, Huntley J Livingston G (2019)*. Population attributable fractions for risk factors for dementia in low-income and middle-income countries: an analysis using cross-sectional survey data. *Lancet Glob Health: 7*: e596–603.*
- Oumellal A , El Alaoui Faris M, Benabdeljlil M (2019). Population Normative Data of the Moroccan Arabic Version of Three Components of the 10/66 Dementia Research Group Cognitive Test Battery; with Moroccan Illiterate and Semi-Illiterate Subjects. Advances in Alzheimer's Disease, 8, 1-14

REFERENCES 4

- Prince M, Acosta D, Chiu H, Scazufca M, Varghese M, for the 10/66 Dementia Research Group(2003.) Dementia diagnosis in developing countries: a cross-cultural validation study Lancet, 361: 909–17.
- Prince M, Wimo A, Guerchet M et al. (2015) Worlde Alzheimer Report 2015. Alzheimer Diseases International.
- Taiebine M, El Alaoui Faris M. (2019) Neuro-cognitive Stiulation for Moroccan patients with Dementia. 7th Scientific Meeting of European Societies Federation of Neuropsychology. Milano, Italy.
- Taiebine M, El Alaoui Faris M. (2019) . Neurolinguistic study of a case of Phonological Alexia in Arabic Language . Accepted for publication in Archives of Communication Disorders.
- UN General Assembly (2017) Progress on the prevention and control of non-communicable diseases. Report of the Secretary General. Dec 21.
- WHO. Dementia: a public health priority. Geneva, World Health Organization, 2012.
- Wu YT, Beiser AS, Breteler MMB et al(2017).The changing prevalence and incidence of dementia over time - current evidence. Nat Rev Neurol Jun;13(6):327-339.