PSYCHOLOGY AND EDUCATION (2021) 58(5): 6948-6964
ISSN: 1553-6939

Ain Shams University Behavioral Assessment tool (ASUB): A New Tool for Assessment of Behavioral and Psychological Symptoms in Elderly Demented Patients

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ABSTRACT

Background: Neuropsychiatric symptoms (psychotic, behavioral and mood) are very common in dementia patients. They are major source of excess disability, patient distress and caregiver burden, thus appropriate assessment and quantification of these symptoms in elderly demented patients is mandated.

Aim of the Work:To assess the reliability of Ain shams university behavioral assessment tool in the diagnosis of neuropsychiatric symptoms in dementia compared to Behavior Rating Scale for Dementia of the Consortium to Establish a Registry for Alzheimer's disease CERAD-BRSD.

Methods: An observational cross sectional study was conducted on 70 elderly demented patients aged 60 years and above and their primary caregivers. All patients underwent a comprehensive geriatric assessment.

Results:The recruited sample included 15 cases with mild dementia, 42 with moderate dementia and 13 with severe dementia.17.1%of the cases had stroke, 8.5 % had Parkinsonism, 28.6% had Hypertension and18.6% had ischemic heart disease.92.9%of the studied persons were negative for depression asassessed by Cornell scale. 48.6% of the cases were assisted in ADL and 45.7 were dependent. Regarding IADL, 75.7% of the cases were dependent and 18.6 % were assisted.The most prevalent neuropsychiatric symptoms in our study were agitation, anxiety and mood disturbance. They were more common in moderate dementia. Delusions and hallucination were more prevalent among mild and moderate dementia. The internal consistency for ASUB was **0.813** and for CERAD-BRSD was **0.865**.

Conclusions: ASUB is a new Arabic tool that is reliable for the assessment of neuropsychiatric symptoms of dementia.

Keywords*:* Dementia, Neuropsychiatric symptoms, Assessment tools

Background

Behavioral and psychological symptoms of dementia as (agitation, depression, apathy, psychosis, aggression, sleep problems and wandering) occur across all stages of dementia, however: their types and prevalence depend on the stage of dementia. Anxiety and depression are

common in early stage Alzheimer's disease and may worsen with progression.[1]

Nearly all demented patients will suffer one or more of these symptoms over the course of their illness. These symptoms are considered the most complex, stressful, and costly aspects of care. They are associated with excess morbidity, mortality, hospital stays, early nursing home placement, family care- givers stress and depression.[2]

Currently,there are many tools used to measure the neuropsychiatric symptoms in patients with dementia. They include the Neuropsychiatric Inventory (NPI), the Behavior Rating Scale for Dementia of the Consortium to Establish a Registry for Alzheimer's disease (CERAD-BRSD) or the Behavioral Pathology in Alzheimer's disease Scale (BEHAVE-AD).[3]

These instruments are either broad instruments, that can measure multiple spectra of neuropsychiatric symptoms or narrow scales instruments that can assess only one spectrum of symptoms. Broad scales are very useful in providing a general overview of BPSD as they are easy to use and are often shorter and less time consuming as NPI and CERAD-BRSD.[4]

The **CERAD-BRSD** is a highly recommended tool for assessment of behavioral symptoms associated with dementia,but its limitations are cost, complex scoring system and the need for a specialized and experienced assessor.[5]

The need to develop an Arabic tool to use instead of the translated scales would ensure each item clarity and that it is culturally accepted to the Arab population. According to our knowledge, there are only two tools translated into Arabic (NPI- CERAD-BRSD). One of the major barriers to use both tools is the cost, thus their use can't be disseminated for in clinical settings.

AIM OF THE WORK

To develop a new Arabic tool for the diagnosis of neuropsychiatric symptoms in dementia and compare its reliability to CERAD-BRSD tool.

Methods

An observational cross sectional study was conducted on 70 elderly demented patients and their primary caregivers. All patients underwent comprehensive geriatric assessment. The caregivers completed both ASUB and CERAD-BRSD.The participants were recruited from inpatient ward and outpatient memory clinics in Ain Shams University hospital.

Inclusion criteria: Senior individuals 60 years or older who were diagnosed with dementia (Alzheimer's dementia, vascular, and mixed type) with a consent obtained from their caregivers to participate in the study.

Exclusion criteria: Patients or caregivers who were unwilling to participate, patients with positive history of primary psychiatric illness as schizophrenia or major depressive disorder on regular antidepressant medications, patients on antipsychotic drugs and patient who had recent stroke, mild cognitive impairment or delirium.

Patients on antidepressant or antipsychotic drugs were excluded, because their use can affect the frequency of behavioral symptoms. Other less common types of dementia were excluded from the study.

Diagnosis of dementia in the patients' records was based on the criteria of the DSM-5[6]with a Clinical Dementia Rating (CDR) score ≥ 1[7].

Assessment: Demographic data, past medical history and drug history were obtained.

Assessment of cognition using MOCA test (Montreal-cognitive assessment test):The Moca test is a screening test for dementia which

assess global cognitive function.Itassesses memory, visuospatial ability, executive function, attention, concentration, working memory and orientation maximum score of 30, normal ≥ 26 / 30, mild dementia <-23/30, moderate dementia <17/30 and severe dementia <9/30 and Different domains of Cognitive functions of the patients were assessed by MOCA test (Montreal-cognitive assessment test): The Moca test is a screening test for dementia which assess global cognitive function that assesses memory, visuospatial ability, executive function, attention, concentration, working memory and orientation maximum score of 30, normal ≥ 26 / 30, mild dementia <-23/30, moderate dementia <17/30 and severe dementia <9/30[8].

Assessment of type of dementia by Hatchinski ischemic score (HIS):A simple clinical tool used for differentiating types of dementia (primary degenerative, vascular or multi-infarct, mixed type)**.**It was originally developed to establish a relationship between cerebral blood flow and dementia. Patients scoring 7 or greater are classified as having 'multi-infarct dementia (vascular dementia), and patients scoring ≤4 are classified as having 'primary degenerative dementia (Alzheimer disease). [9]

Assessment of mood of every participant The Cornell Scale for Depression in Dementia (CSDD) ***Alexopoulos et al.***[10]Arabic version***Shehata et al.***[11]**.**The CSDD was specifically developed to assess signs and symptoms of major depression in demented patients. Because some of these patients may give unreliable reports, the CSDD uses a comprehensive interviewing approach that derives information from the patient and the informant. The CSDD takes approximately 20 minutes to administer. Each item is rated for severity on a scale of 0-2 (0=absent, 1=mild or intermittent, 2=severe). The item scores are added. Scores above 10 indicate a probable major depression.

Assessment of functional impairment using:*Activities of Daily Living Scale (ADL):*[12]**:** Which assess the ability to carry out the basic self-care daily living tasks including; bathing, dressing, toileting, continence, feeding and transfer. Each criteria is graded according to level of dependence of the patient; either performs independently, performs with assistance, or unable to perform. A score of (0) indicates completely dependent, (1-5) assisted, and (6) is totally independent.

Instrumental Activities of Daily Living Scale (IADL):[13]**.** It measures the patient's ability to form an independent household (e.g. shopping - driving or using public transportation- telephone use-food preparation-housework- taking medications-handling finances).

The scoring category is to rate each item 1(unable to perform), 2(need assistance), 3 (independent) and sum the eight responses. The higher the score, the greater the person's abilities. [14]

Assessment of behavioral changes in dementia patients by using The Consortium to Establish a Registry for Alzheimer's Disease (CERAD) [15]**:** The (BRSD CERAD) assesses six subscales, depressive symptoms, psychotic symptoms, inertia, vegetative symptoms, irritability/aggression, and behavioral disregulation, through a 48-item instrument, which was recoded to 46 items according to 1996 scoring rules, based on which the total weighted scores (maximum167) were computed for total score analysis**.** 30 questions were obtained covering 6 subscales and conducted on the patients and their primary caregivers according to study done by **Tariot et al.** [16]Arabic version of CERAD BDRS was obtained after obtaining the authors' permission. [17][18]
Although CERAD-BRSD was primarily used for Alzheimer's patients, it was applied on different types of dementia during the development of the Korean version of BRSD. [19]

Development of ASUB through four phases: development of the questions through brain storming sessions byfour clinical experts in geriatric psychology. The questions included the most common neuropsychiatric symptoms obtained from patient's medical records documenting the caregiver complaints and symptoms reported in literature to describe the neuropsychiatric symptoms commonly encountered in dementia patients. Questions developed to cover behavioral domains occurring in elderly demented patients as agitation, delusions, hallucination, phobia, anxiety, aberrant motor behavior, disinhibtion, eating and sleep problems and euphoria, reviewing of the generated tool and removal of repeated questions, clarifying any ambiguous words and using simple language were done.

Then the generated tool ASUB was evaluated by an expert panel of 4 experts for symptoms relevance and clarity of items and their significance.

The expert panel recommended removal of the redundant questions, using modern standard Arabic language to facilitate use in other countries and different Arabic dialect, one of the experts recommended adding items as regard infidelity and sexual behavior but there were concerns from other experts about adding them due to cultural difference in Egypt as these questions can be offending to the patients and their care givers.During the pilot study, questions about infidelity and sexual behavior were asked but the caregivers refused to respond to these items.

Pilot study: The test was applied on primary caregivers of 20 elderly demented patients aging 60 years or more males and females recruited from inpatient ward and outpatient clinics in Ain Shams University hospital and their caregivers.

They were asked about presence of these symptoms, its frequency in last month. They were asked about the clarity of each question, how they understood the questions, if they recommend the use of easier words and if there were any other symptoms not mentioned in the questionnaire to be added.

Few questions were modified to make the test more suitable and easier for the caregivers, One item question was omitted from the delusions domain (question does the patient think that othersare persecuting him) and two items in hallucinations (does the patient smell strange odors or feel there are things crawl on his skin) as none of the caregivers in our study or from the reviewed medical records reported these symptoms, and in disinhibition (loss of control of his impulses and say crude things), and some subdomains were merged as sleep and eating problems were merged in a single domain which reflect activity pattern problems. Apathy, euphoria and depression were merged as mood disturbances. Anxiety and irritability questions were reduced into one question.

Psychometric evaluation of ASUB tool: The tool was handed to the caregivers at the end of the interview; each item was scored as o absent, 1 occasionally, or 2 most of the times, 3 all the time. Each domain scored as the sum of items scores.

Statistical analysis: Data were collected, revised, coded and entered to the Statistical Package for Social Science (IBM SPSS) version 23.

Descriptive statistics were done for quantitative data as minimum& maximum of the range as well as mean±SD(standard deviation)for quantitative normally distributed data, median and 1st& 3rd inter-quartile range for quantitative non-normally distributed data, while it was done for qualitative data as number and percentage.

Cronbach’s alpha testing was used to test reliability of different techniques.

The level of significance was taken at P value < 0.050 is significant, otherwise is non-significant. The p-value is a statistical measure for the probability that the results observed in a study could have occurred by chance.

Ethical consideration: The ethical committee of the faculty of medicine at Ain Shams University approval was obtained no FWA 000017585, informed consent was obtained from caregivers as patients were demented and confidentiality was respected.

RESULTS

The mean age of the participants was 73.57 ± 7.92. Females were 58.6% of the recruited cases. 52.9% of the participants were educated and 51.4% of them were married. (Table 1).

17.1% of the studied patients had stroke, 8.5 % of them had Parkinsonism, 28.6% of them had HTN and18.6% had ISHD.

42 of the studied participants had moderate dementia, 13 of them had severe dementia and 15of them had mild dementia. 33had vascular dementia and 27 had mixed dementia and 10 had Alzheimer dementia.

92.9%of the studied patients were negative for major depression as assessed by Cornell scale, 48.6% were assisted in ADL, and 45.7 were dependent, 75.7% were dependent in IADL, and 18.6 % were assisted in IADL as in table 1.

Frequency of behavioral symptoms with severity of dementia was obtained. The most prevalent symptoms were agitation, anxiety and mood disturbance which were more common in moderate dementia. Delusions and hallucination were prevalent more in mild and moderate dementia than severe cases of dementia as shown in table 3-4

ASUB and CERAD-BRSD subdomains were correlated as in table 4, 5, delusions and hallucinations were correlated to each other. Agitation and (irritability, anxiety) were correlated to each other. Eating and sleep problems and vegetative symptoms were correlated.

72%of participants had delusions and hallucinations by ASUB while 81% by CERAD-BRSD.80% of the studied patients had mood disturbance by ASUB and 72%of them had depressive symptoms by CERAD-BRSD.70%of the studied cases had agitation by ASUB and 69% had anxiety, irritability by CERAD-BRSD.73%of the participants had eating and sleep problems by ASUB and 70% had vegetative symptoms by CERAD-BRSD.Reliability and internal consistency were measured. Internal consistency for ASUB was **0.813** and for CERAD–BRSD was **0.865**.table (6)

Tables

Table (1): Demographic data and characteristics of the studied patients

		No. = 70
Age	**Mean±SD**	73.57 ± 7.92
	Range	60 – 95
Sex	**Female**	41 (58.6%)
	Male	29 (41.4%)
Education	**Non educated**	33 (47.1%)
	Educated	37 (52.9%)
Marital state	**Widow**	34 (48.6%)
	Married	36 (51.4%)

		No.	%
Strokes		12	17.1%
parkinsonism		6	8.5%
HTN		20	28.6%
ISHD		13	18.6%
Hypothyroidism		8	11.4%
Liver disease		3	4.3%
Renal disease		10	14.3%
		No.	%
MOCA	**Mild dementia**	15	21.4%
	Moderate dementia	42	60.0%
	Severe dementia	13	18.6%
HIS	**Vascular dementia**	33	47.1%
	Mixed dementia	27	38.6%
	Alzheimer dementia	10	14.3%
CORNELL	**Negative**	65	92.9%
	Positive	5	7.1%
ADL	**Independent**	4	5.7%
	Assisted	34	48.6%
	Dependent	32	45.7%
IADL	**Independent**	4	5.7%
	Assisted	13	18.6%
	Dependent	53	75.7%

Table (2): Description of frequency of sub domains of ASUB with severity of dementia

Tool 1 (ASUB)		**MOCA**			**Test value**	**P-value**
		Mild dementia	**Moderate dementia**	**Severe dementia**		
		No. = 15	**No. = 42**	**No. = 13**		
Delusions	**Mean ± SD**	2.20 ± 1.26	2.26 ± 0.99	2.00 ± 1.00	0.698	0.403
	Range	0 – 5	1 – 5	1 – 4		
Hallucination	**Mean ± SD**	2.67 ± 0.82	2.86 ± 1.00	3.00 ± 1.00	0.247	0.619
	Range	2 – 4	1 – 5	2 – 5		
Agitation	**Mean ± SD**	4.33 ± 1.23	4.02 ± 1.28	3.85 ± 0.99	0.113	0.736
	Range	2 – 7	2 – 7	2 – 5		
Mood disturbances	**Mean ± SD**	5.27 ± 2.15	4.98 ± 1.79	5.46 ± 1.81	0.862	0.353
	Range	2 – 9	1 – 9	1 – 8		
Eating and sleep	**Mean ± SD**	4.20 ± 1.78	4.26 ± 1.89	4.08 ± 1.80	0.049	0.825

problem	**Range**	1 – 8	1 – 8	1 – 6		
Abnormal behavior	**Mean ± SD**	4.33 ± 2.55	4.29 ± 2.03	3.85 ± 2.03	0.949	0.330
	Range	0 – 9	0 – 10	1 – 8		
Phobia	**Mean ± SD**	3.60 ± 1.92	3.40 ± 1.81	4.31 ± 1.97	2.150	0.143
	Range	1 – 7	1 – 7	1 – 7		
Anxiety, irritability	**Mean ± SD**	1.20 ± 1.15	1.33 ± 1.07	1.46 ± 1.13	0.129	0.720
	Range	0 – 3	03	03		
Total score	**Mean ± SD**	27.80 ± 4.83	27.40 ± 5.04	28.00 ± 4.20	0.101	0.750
	Range	19 – 36	17 – 36	22 – 33		

‡: Kruskal Wallis test, HS: highly significant, NS: Non significant, P-value <0.05, P-value >0.05, P-value< 0.01, S: Significant

Table (3): Description of frequency of sub domains in CERAD-BRSD with severity of dementia

Tool 2 (CERAD-BRSD)		**MOCA**			**Test value**	**P-value**
		Mild dementia	**Moderate dementia**	**Severe dementia**		
		No. = 15	**No. = 42**	**No. = 13**		
Depressive symptoms	**Mean ± SD**	14.33 ± 1.5	13.33 ± 1.88	13.62 ± 2.06	3.081	0.214
	Range	12 – 18	9 – 18	10 – 17		
Inertia	**Mean ± SD**	6.4 ± 0.91	6.45 ± 1.37	6.77 ± 1.42	2.079	0.354
	Range	4 – 7	2 – 9	3 – 8		
Irritability, aggression	**Mean ± SD**	11.47 ± 2.39	11.83 ± 1.81	11.31 ± 1.84	0.960	0.619
	Range	6 – 15	8 – 15	7 – 14		
Vegetative symptoms	**Mean ± SD**	9.13 ± 1.13	9.24 ± 1.21	9.23 ± 0.73	0.313	0.855
	Range	8 – 11	7 – 12	8 – 11		
Behavioral dysregulation	**Mean ± SD**	12.47 ± 0.92	12.48 ± 1.47	11.69 ± 1.6	3.063	0.216
	Range	11 – 14	9 – 15	8 – 14		
Psychotic symptoms	**Mean ± SD**	13.73 ± 1.33	13.36 ± 1.74	13.23 ± 1.64	0.809	0.667
	Range	11 – 16	10 – 16	10 – 16		
Total score	**Mean ± SD**	67.53 ± 3.7	66.69 ± 3.96	65.85 ± 3.44	1.560	0.458
	Range	58 – 72	56 – 75	61 – 71		

‡: Kruskal Wallis test, HS: Highly significant, NS: Non significant, P-value <0.05, P-value >0.05, P-value< 0.01, S: Significant

Table (4): Correlation between subdomains of ASUB AND CERAD-BRSD tools

ASUB SUBDOMAINS	CERAD–BRSD SUBDOMAINS	R value	P value
Delusions	Psychotic symptoms	0.313**	0.008*
Hallucinations	Psychotic symptoms	0.376**	0.001*
Agitation	Irritability, aggression	0.344**	0.004*
	Behavioral desregulation	0.270*	0.024*

Mood disturbance	Depressive symptoms	0.316**	0.008*
Eating and sleep problems	Vegetative symptoms	0.387**	0.001*

These tables show significant correlation between subdomains of ASUB and CERAD-BRSD.

Table (5): Cronbach's Alpha for reliability and internal consistency of both tools

ASUB subdomains	**No. of items**	**Cronbach's Alpha**
Delusions	3	0.645
Hallucination	3	0.723
Agitation	3	0.701
Mood disturbances	10	0.802
Eating and sleep problem	6	0.738
Abnormal behavior	5	0.678
Phobia	6	0.789
Anxiety irritability	1	-
Total ASUB	37	0.813
CERAD-BRSD subdomains	**No. of items**	**Cronbach's Alpha**
Depressive symptoms	7	0.725
Inertia	3	0.687
Irritability aggression	5	0.699
Vegetative symptoms	4	0.708
Behavioral dysregulation	5	0.711
Psychotic symptoms	6	0.813
Total CERAD	30	0.865

problems or a family history of psychiatric disorder.

The sleep pattern was affected in demented patients especially with moderate and severe dementia. This was consistent with **Eastwoodet al.** [23]who stated that sleep disturbances especially in Alzheimer's dementia patients are characterized by fragmented sleep or disruption in the day–night sleep cycle. They appear to become progressively worse as the disease progresses. Although the severity of this disturbance varies considerably among individual patients, other different factors may affect sleep quality in demented elderly.

According to **Nowrangi et al.**[24] Aberrant motor behavior, nighttime behavior disturbances, and eating abnormalities symptoms were more progressive from the very early to middle stages of dementia.

Moreover,**Lövheim et al.**[25]found that aberrant motor behavior and eating problems, showed the highest severity and occurrence in moderate cases and lessened at later stages of dementia.

Similar to other studies as**Aalten et al.**[26]**,** we have found that elated mood was a rare symptom in dementia and if it did occur, these episodes do not persist.

In our study, the most prevalent neuropsychiatric symptoms were agitation, anxiety and mood disturbance and were more common in moderate dementia and this was

DISCUSSION

Behavioral and psychological symptoms of dementia (BPSD) affect almost all people with dementia and these symptoms increases with progression of cognitive impairment. BPSD are associated with an increased risk of long-term hospitalization and medication use and decreased quality of life of persons with dementia and their caregivers**.** [20]Our study purpose was to develop a new reliable Arabic tool easy to use and suitable for Arabic countries.

The frequency of each symptom was reportedby both ASUB and CERAD-BRSD.Our study revealed that delusions and hallucination were more prevalent in mild and moderate dementia when compared to cases with severe dementia which was consistent with**Zaudig**[21] who stated that delusions and hallucinations usually manifest for the first time in patients with moderate cognitive decline and tend to decrease or disappear in severe stages of dementia probably due to the inability to articulate psychotic experience.

On the contrary, **Steinberg et al.**[22]found that psychotic symptoms were persistent and most often seen in those with moderate or severe cognitive impairment and the more severe the cognitive impairment, the higher rates of psychosis. It was more common in institutionalized participants and those with drinking

Reliability of ASUB was measured by evaluation of its internal consistency by calculating the Cronbach's alpha coefficient for each subdomain and the whole tool as well. The internal consistencies were generally high.

The internal consistency for ASUB was **0.813** and for CERAD-BRSD was **0.865**.the level of internal consistency among subdomains of ASUB was high with a Cronbach's alpha of overall reliability 0.813. This level of internal consistency was accepted for previous similar tools developed to assess BPSD. **Davidsdottir et al.**[30]in their study reported a Cronbach's alpha of 0.81and 0.76 NPI with BEHAVE-AD tool, respectively.

The internal consistency of eating and sleep problems was 0.73 and the internal consistency for agitation was 0.70 which was comparable to corresponding domains in NPI. **Leung et al.** [31] in their validation of NPI reported an internal consistency for hallucination was 0.72.the internal consistency for mood disturbance was0.80.as regard abnormal behavior, the internal consistency was 0.67 and 0.78 for phobia.

Most instruments measuring neuropsychiatric symptoms do not include phobia measurement. However our study found that it was prevalent especially in moderate cases of dementia with internal consistency 0.78.

consistent with **Steinberg et al.** [27] who reported that agitation, anxiety and depression were common, persistent, and increase with severity and progression of dementia, also Anxiety and depression may coexist and overlap with various symptoms, such as agitation and the awareness of the cognitive deficiencies with resulting helplessness.

Unlike **Di Iulio et al.**[28] depression was more frequent and severe in the very early stages of dementia due to pathological changes in regions of the brain associated with its pathogenesis or due to emotional reaction to the decline of cognitive function in the early stage of dementia.

Lyketsos et al.[29] depression was more frequent and severe in the very early stages of dementia due to pathological changes in regions of the brain associated with its pathogenesis or due to emotional reaction to the decline of cognitive function in the early stage of dementia. Reported that the affective symptoms (depression, anxiety and apathy) tend to coexist from early stages of dementia and can be used as one cluster.

92.9%of the studied patients were negative for major depression as assessed by Cornell scale. However, 80% of cases had depressive symptoms by ASUB and 72% had some depressive symptoms by CERAD-BRSD.

Further studies are needed to compare the sensitivities and specificities of the three tools compared to reference criteria.

accuracy of each subdomain and inter-rater reliability are needed.

Conclusions

ASUB is a reliable tool and could help in assessment of neuropsychological symptoms of dementia.

List of abbreviations:

(ASUB): Ain Shams University Behavioral Assessment tool:(ADL): activities of daily living: (BEHAVE-AD): Behavioral Pathology in Alzheimer's disease Scale:(BPSD): Behavioral and psychological symptoms of dementia**:**(CERAD-BRSD): Behavior Rating Scale for Dementia of the Consortium to Establish a Registry for Alzheimer's disease: (CDR) clinical dementia rating scale::(CSDD): Cornell Scale for Depression in Dementia :(DSM5): Diagnostic and Statistical Manual of Mental Disorders, 5th Edition:(HIS): Hatchinski ischemic score:(HTN): hypertension:(ISHD): ischemic heart disease :(IADL): *Instrumental Activities of Daily Living Scale*::(MOCA) test: Montreal-Cognitive Assessment test: (NPI): Neuropsychiatric Inventory.

Concurrent validity of ASUB was evaluated by measuring correlation coefficients for ASUB subdomains scores and corresponding subdomains scores of CERAD-BRSD which were significantly correlated, despite the difference in scoring systems of both tools. The correlation of the total scores of ASUB and CERAD-BRSD was significant (r value **0.395**, p value **0.001)**. There was a significant correlation between ASUB subdomains and the corresponding subdomains on CERAD-BRSD.

Both ASUB and CERAD BRSD are multidimensional tools. They aim to quantify the neuropsychiatric symptoms and allow for follow up of cases across time and in response to therapeutic interventions. There was no defined sensitivity or specificity for CERAD BRSD in the development study **Tariot et al**· [32] or in the subsequent longitudinal study for dementia progression Patterson et al. [33] However, comparing each ASUB subdomain to an index tool is needed in further research.

This study has three limitations first being single center small size study. The small sample size was a barrier to perform a construct validity using factor analysis, which will be the scope of our future research. Secondly, the under-representation of mild cases of dementia so further research is needed with larger sample size with more patients with mild dementia. Thirdly, future studies to assess test retest reliability, diagnostic

depression. *The American Journal of Geriatric Psychiatry*, *13*(6), 441-449.

3. **Monteiro, I. M., Boksay, I., Auer, S. R., Torossian, C., Ferris, S. H., &Reisberg, B. (2001).** Addition of a frequency-weighted score to the Behavioral Pathology in Alzheimer's Disease Rating Scale: the BEHAVE-AD-FW: methodology and reliability. *European Psychiatry*, *16*(S1), 5s-24S.

4. **Cohen-Mansfield, J., &Golander, H. (2011**). The measurement of psychosis in dementia: a comparison of assessment tools. *Alzheimer Disease & Associated Disorders*, *25*(2), 101-108.

5. **Jeon, Y. H., Sansoni, J., Low, L. F., Chenoweth, L., Zapart, S., Sansoni, E., &Marosszeky, N. (2011).** Recommended measures for the assessment of behavioral disturbances associated with dementia. *The American Journal of Geriatric Psychiatry*, *19*(5), 403-415.

6.**American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Fifth Edition. American Psychiatric Association; 2013**.

7.**Karam, G.E., Khandakji, M.N.,Sahakian, N.S.,Dandan, J.C.,&Karam, E.G. (2018)**:validation into Arabic versions of Dementia Rating

Declarations:

Ethics approval and consent to participate

Our study is approved by the ethical committee of the faculty of medicine at Ain Shams University No FWA 000017585. Subjects were enrolled in the study after explaining the purpose of the study, obtaining informed oral consent and Confidentiality was assured.

Consent for publication: was obtained.

Availability of data and materials

The data sets used and /or analyzed during the current study are available from the corresponding
Author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding bodies were involved in funding this research.

Acknowledgment

The authors thank the participants of the study.

REFERENCES

1. **Tucker, I. (2010).** Management of inappropriate sexual behaviors in dementia: a literature review. *International Psychogeriatrics*, *22*(5), 683-692.

2. **Kales, H. C., Chen, P., Blow, F. C., Welsh, D. E., & Mellow, A. M. (2005).** Rates of clinical depression diagnosis, functional impairment, and nursing home placement in coexisting dementia and

psychological function.JAMA:(185):914-919

13. **Lawton, M. P., & Brody, E. M. (1969).** Assessment of older people: self-maintaining and instrumental activities of daily living. The gerontologist, 9(3_Part_1), 179-186.
14. **Graf C.** The Lawton instrumental activities of daily living scale. AJN The American Journal of Nursing 2008; 108(4):52-62.
15. **Mack, J. L., Patterson, M. B., &Tariot, P. N. (1999).** Behavior Rating Scale for Dementia: development of test scales and presentation of data for 555 individuals with Alzheimer's disease. *Journal of geriatric psychiatry and neurology*, *12*(4), 211-223.
16. **Tariot, P. N., Mack, J. L., Patterson, M. B., Edland, S. D., Weiner, M. F., Fillenbaum, G., ... & Stern, Y. (1995).** The behavior rating scale for dementia of the Consortium to Establish a Registry for Alzheimer's Disease. *The American journal of psychiatry*.
17. **Elokl M/Elbanouby M/Mortagy M/elAtrebi M/ELsabwa M (2001).**Ain Shams University, faculty of medicine department of Geriatrics. Prevalence of AD, and other types of dementia in Egypt. Int Psychogeriatric, 13, Supplement 2**.**

Scales, Dementia Caregivers Scales, and Dementia Research Instruments. Alzheimer's &dementia: diagnosis, assessment &disease monitoring.

8. **Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., ...&Chertkow, H. (2005).** The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. *Journal of the American Geriatrics Society*, *53*(4), 695-699.
9. **Hachinski, V. C., Iliff, L. D., Zilhka, E., Du Boulay, G. H., McAllister, V. L., Marshall, J., ... &Symon, L. (1975).** Cerebral blood flow in dementia. *Archives of neurology*, *32*(9), 632-637.
10. **Alexopoulos, G. S., Abrams, R. C., Young, R. C., &Shamoian, C. A. (1988).** Cornell scale for depression in dementia. *Biological psychiatry*, *23*(3), 271-284.
11. **Metwally, A. S., El-Banouby, M. H., Mortagy, A. K., &Ghanem, M. (1998).** Prevalence of depression among Egyptian geriatric community. *Faculty of Medicine, Ain Shams University*.
12. **Katz S,Ford AB, etal. (1963).** studies of illness in the aged.the index of ADL:astandarized measure of biological and

The persistence of neuropsychiatric symptoms in dementia: the Cache County Study. *International journal of geriatric psychiatry*, *19*(1), 19-26.

23. **Eastwood, R., &Reisberg, B. (1996).** Mood and behaviour. *Clinical diagnosis and management of Alzheimer's disease. London: Martin Dunitz*, 175-90.
24. **Nowrangi, M. A., Lyketsos, C. G., & Rosenberg, P. B. (2015).** Principles and management of neuropsychiatric symptoms in Alzheimer's dementia. *Alzheimer's research & therapy*, *7*(1), 1-10.
25. **Lövheim, H., Sandman, P. O., Karlsson, S., & Gustafson, Y. (2008).** Behavioral and psychological symptoms of dementia in relation to level of cognitive impairment. *International psychogeriatrics*, *20*(4), 777-789.
26. **Aalten, P., De Vugt, M. E., Jaspers, N., Jolles, J., &Verhey, F. R. (2005).** The course of neuropsychiatric symptoms in dementia. Part I: findings from the two-year longitudinal Maasbed study. *International journal of geriatric psychiatry*, *20*(6), 523-530.
27. **Steinberg, M., Shao, H., Zandi, P., Lyketsos, C. G.,**

18. **CERAD — Consortium to Establish a Registry for Alzheimer's disease (2018)** Duke center for the study of aging and human development.https://sites.duke.edu/centerforaging/cerad/translations (accessed 12 January 2019).
19. **Youn, J. C., Lee, D. Y., Lee, J. H., Kim, K. W., Jhoo, J. H., Choo, I. H., ... & Woo, J. I. (2008).** Development of a Korean version of the behavior rating scale for dementia (BRSD-K). *International Journal of Geriatric Psychiatry: A journal of the psychiatry of late life and allied sciences*, *23*(7), 677-684.
20. **Savva, G. M., Zaccai, J., Matthews, F. E., Davidson, J. E., McKeith, I., &Brayne, C. (2009).** Prevalence, correlates and course of behavioural and psychological symptoms of dementia in the population. *The British Journal of Psychiatry*, *194*(3), 212-219.
21. **Zaudig, M. (2000).** Behavioral and psychological symptoms of dementia in the International Classification of Diseases (ICD)-10 and Beyond (ICD-11). *International Psychogeriatrics*, *12*(S1), 29-40.
22. **Steinberg, M., Tschanz, J. T., Corcoran, C., Steffens, D. C., Norton, M. C., Lyketsos, C. G., &Breitner, J. C. (2004).**

version of the Neuropsychiatric Inventory with Caregiver Distress (NPI-D). *Nordic journal of psychiatry*, *66*(1), 26-32.

31. Leung, V. P., Lam, L. C., Chiu, H. F., Cummings, J. L., & Chen, Q. L. (2001). Validation study of the Chinese version of the neuropsychiatric inventory (CNPI). *International Journal of Geriatric Psychiatry*, *16*(8), 789-793.

32. Tariot, P. N., Mack, J. L., Patterson, M. B., Edland, S. D., Weiner, M. F., Fillenbaum, G., ... & Stern, Y. (1995). The behavior rating scale for dementia of the Consortium to Establish a Registry for Alzheimer's Disease. *The American journal of psychiatry*.

33. Patterson, M. B., Mack, J. L., Mackell, J. A., Thomas, R., Tariot, P., Weiner, M., & Whitehouse, P. J. (1997). A longitudinal study of behavioral pathology across five levels of dementia severity in Alzheimer's disease: The CERAD Behavior Rating Scale for Dementia. *Alzheimer disease and associated disorders*.

Welsh-Bohmer, K. A., Norton, M. C., ...&Tschanz, J. T. (2008). Point and 5-year period prevalence of neuropsychiatric symptoms in dementia: the Cache County Study. *International Journal of Geriatric Psychiatry: A journal of the psychiatry of late life and allied sciences*, *23*(2), 170-177.

28. Di Iulio, F., Palmer, K., Blundo, C., Casini, A. R., Gianni, W., Caltagirone, C., &Spalletta, G. (2010). Occurrence of neuropsychiatric symptoms and psychiatric disorders in mild Alzheimer's disease and mild cognitive impairment subtypes. *International Psychogeriatrics*, *22*(4), 629-640.

29. Lyketsos, C. G., Steinberg, M., Tschanz, J. T., Norton, M. C., Steffens, D. C., &Breitner, J. C. (2000). Mental and behavioral disturbances in dementia: findings from the Cache County Study on Memory in Aging. *American Journal of Psychiatry*, *157*(5), 708-714.

30. Davidsdottir, S. R., Snaedal, J., Karlsdottir, G., Atladottir, I., &Hannesdottir, K. (2012). Validation of the Icelandic

Appendix

استبيان لتقييم التغيرات السلوكيه في مرضي عته الشيخوخه في جامعه عين شمس **(ASUB)**

هقولك مجموعه من الاسئله بالنسبه للمريض ويرجي الاجابه عليها ب نعم او لا مع ذكر تكرار حدوثها في اخر شهر:

	نعم	لا	التكرار (0-3)
1- الاوهام delusions			
1)هل يعتقد ان الاخرين يريدون قتله			
2)هل يعتقد ان زوجته اواقاربه يكرهونه او يكرهون وجوده معهم			
3)هل يعتقد انه يعيش في منزل غير منزله			
2- الهلوسهhallucination			
4)هل يري اشياء غير موجودة			
5)هل يتحدث مع أشخاص غير موجوده			
6)هل يسمع اصوات غير موجوده			
3-الهياج agitation			
7)هل يعاني من نوبات هياج وعصبيه			
8)هل يرفض تناول الطعام او الادويه			
9)هل لديه سلوكيات عدوانيه مع الاخرين			
3- تغيرات مزاجية Mood disturbances			
10)هل يبكي كثيرا او يبدوا حزينا معظم الوقت			
11)هل يحس بانه عديم القيمة 12) هل يتحدث عن الموت كثيرا			
13) هل يفضل البقاء وحيدا و يفضل العزله والانطواء			
14)هل يرفض الخروج والمشي او ممارسه انشطه اعتاد عليها			
15)هل اصبح المريض قليل الكلام والتحدث مع الاخرين			
16)هل يضحك بكثرة علي اشياء غير مضحكة			
17)هل يميل إلى الضحك والقهقهة بكثرة			
18)هل فقد الاهتمام بأنشطة مفضلة لديه			
19) هل فقد الاهتمام بكل من حوله			
4- مشاكل الانشطه اليومية Eatingand sleep problems			
20)هل يعاني من صعوبه في النوم			
21)هل ينام كثيرا عن المعتاد			

22) هل زادت شهيته للطعام			
23) هل قلت شهيته للطعام			
24)هل حدث أن أكل أشياء غريبة كالصابون أو الشمع			
25) هل فقد الاهتمام بالنظافه الشخصية			
5- سلوكيات غريبة Abnormal behavior			
26)هل يفعل اشياء محرجة أمام الآخرين			
27)هل لاحظتم تغيير في سرعه كلامه			
28) هل يعاني من زيادة في الحركة والتجوال داخل وخارج المنزل			
29)هل لاحظتم اي تغير في السلوك او تصرفات غير مناسبة			
30) هل يقوم بتكرار لحركاته بدون داعى			
6- الخوف phobia			
31)هل اصبح يعاني من نوبات من الخوف اوالهلع من الاماكن المغلقه			
32)هل اصبح يخاف من الاماكن العاليه او الصعود بالاسانسير			
33)هل يعاني من نوبات خوف وهلع عند ذهاب لاماكن جديده او مزدحمه			
34)هل يعاني من خوف او هلع عند رؤيه اشخاص جديده			
35)هل يعاني من نوبات خوف او هلع عند رؤيه الحشرات او حيوانات معينه 36) هل اصبح يخاف من الظلام			
7- القلق والتوتر , anxiety irritability			
37) هل لاحظتم عليه القلق والتوتر بدون اسباب			