Original Article

Validation of Arabic version of Revised Memory and Behavior Problems Checklist (RMBPC).

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ABSTRACT :

Background: With the increase in population aging ; there is increase in the prevalence of dementia and this will be associated with development of behavioral and psychological symptoms which are very common and distressing to the caregivers. The most problematic symptoms associated with caregiver stress are agitation, aggression, wandering, purposeless activity, disinhibition, bing eating..etc,. Revised Memory and Behavioral Checklist RMBPC is a 24 items questionnaire used to measure the frequency of behavioral and psychological symptoms of dementia (BPSD) and the degree of upset of caregivers (reaction) to these symptoms.**Aim:** to test validity and reliability of Arabic version of Revised Memory and behavioral problem checklist (RMBPC).**Subjects and Methods:** A cross sectional study involving 100 caregivers of elderly patients previously diagnosed with dementia (moderate to severe) in community dwellings and all of them applied to fill out the Arabic version of RMBPC questionnaire. The questionnaire was subjected to Arabic translation and the reliability and validity were done to the test.

Results: Arabic version of RMBPC is reliable by test re-test reliability. Alpha cronbach and internal consistency by item total correlation showing that there were seven questions of weak correlation. So they are deleted except question 1 and question 13 because of their clinical significance. After deletion of weak questions, the test is valid by construct validity. Construct validity was evaluated by using pearson's correlation coefficient showing that all subscales are strongly correlated with total score. Construct validity by using correlation matrix of RMBPC and other tools ; Zarit , Cornell , ADL &IADL showing that RMBPC is strongly correlated to Zarit and Cornell . **Conclusion:** The Arabic version of 19-items RMBPC is valid and reliable. **Keywords:** Validation , Memory, Arabic , RMBPC , Behavior.

Introduction:

Elderly population is increasing worldwide and Egypt is considered as a part of the world where the elderly population is increasing , as according to the national census in 2014 in Egypt , it found that the elderly population 60 years or older to be 6.9 % and it is expected to be nearly doubled by year 2030. With increasing in age ; there will be large number of diseases that we should pay attention such as dementia as it result in financial burden among the Egyptian community , as regard the prevalence of dementia and cognitive impairment in Egypt , ranges from 3.66 to 39.2%. [1]

Major neurocognitive disorder is an alternative term to dementia in DSM5. It is defined as a significant cognitive decline from a previous level of performance in one or more cognitive domains (complex attention, executive function, learning and memory, language, perceptual–motor, or social cognition) interfering with independence in everyday activities and may be associated with behavioural disturbance , psychotic symptoms and mood disturbance not explained by delirium or other mental disorders. [2]

Behavioral and Psychological Symptoms of Dementia (BPSD) are heterogenous group of non-cognitive symptoms and behaviours that occur in patients of dementia and they are classified into five symptom clusters : perceptual (delusions, hallucinations), motor (pacing, wandering, repetitive movements, physical aggression), verbal (yelling, calling out, repetitive speech, verbal aggression), emotional (euphoria, depression, apathy, anxiety, irritability), vegetative (disturbances in sleep and appetite). [3]

RMBPC can identify the most problematic behavioral and psychological symptoms which is vital in targeting intervention and allocating resources. As it measure prevalence and intensity of different behavioral symptoms and if distressing to caregiver or not and by which degree of distress. It is found that memory problems are more frequent but least distressing, whereas distruptive and psychotic manifestations, aggression, wandering and anxiety tend to be the most intrusive and difficult to cope with. [4,5]

Aim: To test validity and reliability of Arabic version of Revised Memory and behavioral problem checklist (RMBPC) as regard both the frequency of the symptoms and the reaction of the caregivers.

Methods :

Study type :

A Cross sectional study.

Participants :

One hundred (100) caregivers of elderly patients already diagnosed with dementia (moderate to severe) in community dwellings who fill out the Arabic version of RMBPC questionnaire.

Inclusion criteria:

Age: Caregivers for 60 years old patient or more diagnosed as moderate to severe dementia.
Sex: Both males and females.

Exclusion Criteria:

1) Caregivers and patients who are unwilling to participate in the study.
2) Patients with delirium on top of dementia.

Site of recruitment: the participants are recruited from memory clinic in geriatric department in Ain Shams University Hospitals and by telephone as a tele geriatric medicine.

Study tools and procedures:

All participants were subjected to an arranged meeting either in the geriatric clinic or through tele geriatric facilities by telephone in which the following were assessed :

A) <u>First as regard tools done for the patients of dementia :</u>

1- **Assessment of depression by Cornell.** [6]
2- **Assessment of function by ADL and IADL** : Assessment of activities of daily living (ADL) and instrumental activities of daily living (IADL).[7,8]

B) <u>Second as regard tools done for caregivers of the patients of dementia :</u>

3- Behavioral changes of elderly were assessed by caregivers :
Caregivers were subjected to the following ;

1) Their level of education .

2) Caregiver relationship to the patient.

3) Caregiver awareness of behavioral and psychological problems that occur with dementia such as depression, anxiety, agitation, aggression and sleep disturbances.

4) Assessment of frequency of behavioral and psychological problems that occur with elderly by Revised Memory and behavioral problem checklist

(RMBPC) as it was subjected to Arabic translation and and backward translation to be confirmed. [9]

5) The reliability of Arabic version of RMBPC questionnaire was evaluated by test-retest as well as the internal consistency Cronbach's alpha. The validity was tested by criterion validity and construct validity to evaluate the correlation of RMBPC to other validated tools as Zarit , Cornell ,ADL & IADL .

6) Assessment of caregiver burden by Zarit burden scale. [10]

- **Ethical Considerations:** Informed consent was taken from the participants and they were oriented about the nature of the study and they have the right to withdraw at any time The study methodology was reviewed and approved by the Research Review Board of the Geriatrics and Gerontology Department, Faculty of Medicine, Ain Shams University No. FWA 000017585. Confidentiality and privacy of data was ensured.

Statistical analysis:

Data entry and statistical analysis were performed using Statistical Package for Social Science (SPSS) (version 26). Quantitative variables were presented in the form of means and standard deviation. Qualitative variables presented in the form of frequency tables (number and percent). Comparison between quantitative variables were carried out using ANOVA test. Comparison between qualitative variables was carried out using Pearson's $\chi 2$ test.

Assessment of the frequency of symptoms in demetia patients and the reaction of the caregivers to these symptoms in RMBPC was done by rating scale as following

A) Frequency ratings was ranged from 0 to 4, with 0 indicating never occurs and 4 indicating occurs daily or more often.

B) Reaction ratings depended on the occurrence of the behavior being rated. Reaction means were computed only on patient behaviors that occurred (i.e., 1 or greater on the frequency rating). The reaction ratings was ranged from 0 to 4 , with 0 indicating not at all upset the caregiver and 4 indicating extremely upset the caregiver.

Results :

The study was conducted on 100 caregivers of patients with dementia (moderate and severe) recruited from Ain Shams University outpatient memory clinic and through telemedicine . The demographic data and criteria of sample of dementia patient involved in the study were described in table 1.

Table 2 shows that the demographic characteristic of the caregivers and they were 65 females and 35 males , half of them (50%) were in the age group (30-44) , 54% of them had high level of education , 27% of them had low level of education and 19% of them had moderate level of education, 85% of them was one of the siblings and 13% of them was one of the spouse and 2% of them were either a brother or sister.

The RMBPC was translated to Arabic version by the authors and this was done by translation and then backward translation for confirmation , then the reliability was done on 20 cases at the beginning of the study by pilot study then the study was continued to 100 cases. As regard the reliability of the Arabic version of RMBPC which is done by test re-test reliability and by alpha cronbach as > 0.6 is reliable and 0.4 – 0.6 is quit reliable. The result showed the total frequency and reaction of all the subscales (memory , depression and disruptive). As regard the individual reliability of each subscale of the score ; first for the memory subscale ; memory frequency was quit reliable and the reaction to memory symptoms was reliable , second for the disruptive subscale ; disruptive symptoms frequency was reliable in all questions and the reaction to disruptive symptoms was reliable in all questions , third for the depressive subscale ; the reaction to depressive was reliable and the depressive symptoms frequency was quit reliable.

Internal consistency by item-total correlation which is a correlation between the question and the overall assessed score (0.3 or more is a good internal consistency (0.25 – 0.3 is accepted) according to this score , as regard memory symptoms the questions that were weak 1, 3 & 5 so they are deleted except question 1 as it is important for diagnosis (table 3). As regard depressive symptoms the questions that were weak 12,14&18 so they are deleted (table 4). As regard the disruptive symptoms the questions that was weak 13 but it couldn't be deleted as it is an important indicator for burden on caregiver. (table 5).

As regard validity (after deletion of weak questions 3,5,12,14&18) by using construct validity that is measured by correlation coefficient between each item and total subscale (0.3 or more is a good correlation , 025 – 0.3 is accepted), we found that all other questions are valid except frequency of Q2.

Construct validity of total scores and scores of different subscales was done by using pearson's correlation coefficient which is a type of correlation coefficient that represents the relationship between two variables that are measured on the same test (0.3 or more is a good correlation , 0.25-0.3 is accepted) showing that all subscales are strongly correlated with total score and also disruptive symptoms are more correlated with memory symptoms.

Construct validity by using correlation matrix comparing the test to other tests that measure similar qualities to see how highly correlated the two measures are by using correlation matrix of RMBPC in different subscales and total score and other tools ; Zarit ,Cornell , ADL and IADL (0.3 or more is strong correlation) showing that RMBPC is strongly correlated to Zarit and Cornell especially disruptive symptoms. Frequency of depressive symptoms are strongly correlated to Cornell. (table 6).

Table (1) : Demographic data of dementia patients rolled in the study

		N	%
Gender	**Male**	32	32.00
	Female	68	68.00
Age group	**60 - 69 Years old**	29	29.00
	70 - 79 Years old	47	47.00
	80 - 89 Years old	24	24.00
Occupation	**Professionals**	18	18.00
	Sale workers	25	25.00
	Manual workers	57	57.00
Education	**Low level of education**	62	62.00
	Moderate level of education	17	17.00
	High level of education	21	21.00
Marital status	**Married**	38	38.00
	Widow	55	55.00
	Divorced	7	7.00
Off springs	**No**	2	2.00
	One	2	2.00

	Two	17	17.00
	Three	17	17.00
	Four	31	31.00
	Five	18	18.00
	Six	11	11.00
	Seven	1	1.00
	Eight	1	1.00
Lives with	**Husband or wife.**	34	34.00
	Siblings.	64	64.00
	Sister or brother.	2	2.00
Special habits	**No special habits**	73	73.00
	Ex-Smoker	15	15.00
	Current cigarette smoker	9	9.00
	Others (shisha , addiction……..etc.)	3	3.00
Fiancial support	**Pension**	55	55.00
	Relatives	45	45.00
Family hx of dementia	**Negative history**	81	81.00
	Positive history	19	19.00

Table (2) : Demographic data of caregivers of dementia patients participated in the study.

		N	**%**
Caregiver sex	**Male**	35	35.00
	Female	65	65.00
Caregiver age group	**30 - 44 Years old**	50	50.00
	45 - 59 Years old	37	37.00
	60 - 80 Years old	13	13.00
Caregiver education	**Low level of education**	27	27.00
	Moderate level of education	19	19.00
	High level of education	54	54.00
Relationship to the p.t	**Daughter or son**	85	85.00
	Wife or husband	13	13.00
	Brother or sister	2	2.00

Tables (3) : Internal consistency by item-total correlation of all memory questions.

a)frequency

	Corrected Item-Total Correlation
RMBC 1F	.077
RMBC 2F	.223
RMBC 3F	.010
RMBC 4F	.354
RMBC 5F	.187
RMBC 6F	.628
RMBC 7F	.679

b)reaction

	Corrected Item-Total Correlation
RMBC 1R	.118
RMBC 2R	.303
RMBC 3R	.110
RMBC 4R	.250
RMBC 5R	.202
RMBC 6R	.687
RMBC 7R	.729

Tables (4) : Internal consistency by item-total correlation of all depressive questions.

a)frequency

	Corrected Item-Total Correlation
RMBC 12F	-.056-
RMBC 14F	.099
RMBC 17F	.386
RMBC 18F	.177
RMBC 19F	.499
RMBC 20F	.332
RMBC 21F	.212
RMBC 22F	.243
RMBC 23F	.241

b)reaction

	Corrected Item-Total Correlation
RMBC 12R	.011
RMBC 14R	.157
RMBC 17R	.528
RMBC 18R	.226
RMBC 19R	.566
RMBC 20R	.448
RMBC 21R	.304
RMBC 22R	.345
RMBC 23R	.358

Tables (5) : Internal consistency by item-total correlation of all disruptive questions.

a)frequency

	Corrected Item-Total Correlation
RMBC 8F	.195
RMBC 9F	.660
RMBC 10F	.501
RMBC 11F	.416
RMBC 13F	.180
RMBC 15F	.497
RMBC 16F	.580
RMBC 24F	.522

b)reaction

	Corrected Item-Total Correlation
RMBC 8R	.258
RMBC 9R	.648
RMBC 10R	.541
RMBC 11R	.471
RMBC 13R	.185
RMBC 15R	.532
RMBC 16R	.633
RMBC 24R	.536

Table (6) : Construct validity by using correlation matrix of RMBPC in different subscales and total score and other tools ; Zarit ,Cornell , ADL and IADL.

	1	2	3	4	5	6	7	8	9	10	11	12
Zarit (1)	1											
Cornell (2)	.284**	1										
ADL (3)	-.037	-.042	1									
IADL (4)	-.101	.007	.716**	1								
Total frequency (5)	.382**	.437**	-.185	-.140	1							
Total reaction (6)	.356**	.400**	-.146	-.064	.947**	1						
Memory frequency (7)	.175	.098	-.226*	-.260**	.733**	.677**	1					

Depressive frequency (8)	**-.010**	**.278****	**.144**	**.222***	**.441****	**.414****	**.025**	**1**				
Disrputive frequency (9)	**.517****	**.474****	**-.213***	**-.155**	**.717****	**.698****	**.280****	**.006**	**1**			
Memory reaction (10)	**.118**	**.054**	**-.160**	**-.176**	**.688****	**.718****	**.939****	**.020**	**.266****	**1**		
Depressive reaction (11)	**-.019**	**.260****	**.169**	**.251***	**.386****	**.431****	**-.018**	**.948****	**-.009**	**.002**	**1**	
Disrputive reaction (12)	**.524****	**.448****	**-.229***	**-.133**	**.682****	**.711****	**.273****	**-.027**	**.970****	**.268****	**-.020**	**1**

Discussion :

There is increase in the number of elderly populations worldwide and this is associated with increase in the number of age related diseases , one of them is dementia. Dementia is associated with cognitive and function decline as well as psychological and behavioral symptoms that is considered to be the most distressing symptoms to caregivers and it is associated with more burden as regard the cost in institualizations , drug intake and seeking medical advice.

The current study was done to test validity and reliability of Arabic version of RMBPC. This is done by recruitment of 100 cases of caregivers for patient with dementia (moderate to severe) and they were recruited from Ain Shams University Hospital outpatient memory clinic and telegeriatric medicine. The reliability of questionnaire is tested by test -retest as well as the internal consistency Cronbach's alpha. The validity is tested by criterion validity and construct validity.

In the current study as regard the reliability of the Arabic version of RMBPC , it was reliable in all frequency and reaction of the total score and subscales , While as regard the reliability of each question of each subscale , it showed that it was reliable in all the reaction for all of them for the depression , memory and the disruptive symptoms while as regard the frequency it was reliable in disruptive symptoms and the memory and depressive symptoms are quit reliable. Item total correlation showing question 1,3,5,13,12,14&18 are of weak correlation . So they are deleted except question 1 as it is important for diagnosis and question 13 couldn't be deleted as it is an

important indicator for burden on caregiver.

The original version of the Revised Memory and Behavior Problems Checklist (RMBPC) is a 24-item caregiver-report that measure the observable behavioral problems in dementia patients, provides one total score and 3 subscale scores for patient's problems (memory-related, depression, and disruptive behaviors) and parallel scores for caregiver reaction.[9]

The reliability of the original test was done and it was good, with alpha of 0.84 for patient behavior and 0.90 for caregiver reaction. Subscale alphas ranged from 0.67 to 0.89. [9]

Ottoboni , etal 2019 reported that the reliability of Italian version of RMBPC (It-RMBPC) by using test–retest and Cronbach's and the inter-subscale correlation analysis which indicated a good internal consistency, all above than 0.60, but memory in Reaction Scale = 0.52.[11]

Salvia , etal 2011 reported that the reliability of Spanish version of RMBPC (Sp-RMBPC) by using cronbach's alpha and test-retest analysis which showing good internal consistency and reliability of all scales and subscales except test-retest of reaction to depressive symptoms showing moderate retest correlation.[12]

In our study as regard the Arabic version of RMBPC the validity was done by criterion validity after deletion of weak questions (3,5,12,14&18) and it showed that all other questions are valid.

The original version validity was confirmed through comparison of RMBPC scores with well-established indexes of depression, cognitive impairment, and caregiver burden. So the RMBPC is recommended as a reliable and valid tool for the clinical and empirical assessment of behavior problems in dementia patients.[9]

Construct validity by using pearson's correlation coefficient showed that all subscales are strongly correlated with total score and also disruptive symptoms are more correlated with memory symptoms. Construct validity by using correlation matrix of RMBPC and other tools ; Zarit , Cornell , ADL &IADL showing that RMBPC is strongly correlated to Zarit and Cornell especially disruptive symptoms. Frequency of depressive symptoms are strongly correlated to Cornell.

Ottoboni , etal 2019 reported the validation of Italian version of RMBPC (It-RMBPC) through construct validity by using factor analysis , the exploratory factor analysis (EFAs) and they suggested that to move item number 14 from the subscale assessing depression into the subscale assessing disruptive

behavior, and to move item number 24 from the subscale assessing disruptive behavior into the one assessing depression.[11]

Ottoboni , etal 2019 reported that the concurrent validity of the Neuropsychiatric Inventory (NPI) test had positive correlations with all the subscales of It-RMPBC. No correlations between the memory subscale of reaction and NPI scores. HADS (Hospital Anxiety and Depression Scale) scales are moderately correlate with the subscales of It-RMPBC. The Zarit Burden Interview (ZBI) scales are positively correlated with the It-RMBPC scales . The highest correlations were those between the total score of ZBI and the total reaction score.[11]

Salvia , etal 2011 reported that the concurrent and discriminant validity of the Sp-RMBPC showed that total frequency was correlated to depressive and disruptive symptoms. As regard MMSE ; it was correlated with the total frequency in early stages of dementia and also frequency of memory symptoms was strongly correlated with stage of dementia. As regard NPI ; frequency of memory and depressive symptoms was correlated with NPI disruptive scale. It was also found that the total reaction and the reaction of all subscales were correlated with NPI , Zarit , HADS.[12]

Lee and Yoon 2007 reported the validation of Korean version of RMBPC (K-RMBPC) by cross validity by using item analysis, exploratory factor analysis(EFA) & confirmatory factor analysis(CFA). It is found that the internal consistency is excellent, and the convergent and criterion-related validity is confirmed.[13]

Conclusion: Arabic version of RMBPC is valid and reliable after deletion of five weak questions while question 1,13 couldn't be deleted despite of being weak reliable as question 1 is important for diagnosis and question 13 is an important indicator for caregiver burden. So the total number of questions for the valid and reliable Arabic version of RMBPC questionnaire is19 questions and this could be used as reliable method for detecting the behavioral and psychological symptoms in the patients with dementia (moderate to severe) and to measure the burden on the caregiver in order to provide effective management for both.

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