ORIGINAL ARTICLE

ALEXITHYMIA PREDICTS COGNITIVE DEFICITS IN PATIENTS WITH IDIOPATHIC PARKINSON'S DISEASE

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Background: In recent years, alexithymia has gained attention of medical researchers as a prognostic factor for serious health problems. The present study aimed to assess alexithymia as a determinant of cognitive decline in patients with Parkinson's disease. **Methods:** Patients diagnosed with Parkinson's disease (n=60) at Bahawal Victoria Hospital, Civil Hospital Bahawalpur and Nishter Hospital Multan during May 2016 until June 2017 participated in the study. Healthy individuals (n=60) took part in the study from local community as controls. Participants completed Bermond–Vorst Alexithymia Questionnaire and Montreal Cognitive Assessment. It was a cross sectional study design. Purposive sampling technique was used and data was analysed through multivariate analysis of variance and bivariate correlation. **Results**: Patients with Parkinson's disease (177.96±8.93) showed higher attitudes of alexithymia as compared with healthy individuals (37.46±8.01), F (1,118) = 8216.52, p<0.001, ηp^2=.98. In contrast with healthy controls (28.60±0.58), patients with Parkinson's disease (2.25±.95) were cognitively impaired F (1,118) =36424.38, p<0.001, ηp^2=.99. Alexithymia was a significant predictor of cognitive performance (R^2=0.99, F (2, 119) = 5698.95, p<0.001). **Conclusion**: Alexithymia is a significant marker of cognitive decline in patients with Parkinson's disease.

Keywords: Parkinson's disease; Cognition; Emotion; Alexithymia

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INTRODUCTION

Alexithymia is a disorder of affect regulation which is associated with several physical and mental health problems in clinical and non-clinical population studies.[1] Patients with alexithymia have difficulties in identification, recognition and regulation of emotions.[2,3] Systematic review of literature suggests that the prevalence of alexithymia in patients with Parkinson's disease (PP-D) is double as compared with healthy individuals.[4] Parkinsonism is a neurodegenerative disorder accompanied by movement and psychological disorders, such as cognitive impairment, psychotic symptoms which ultimately increase socioeconomic and personal burden of the disease.[5]

According to recent news, PP-D is spreading alarmingly; approximate more than 100 people are diagnosed with PP-D every day in Pakistan. It is estimated that the present number of PP-D patients which is around 600,000 will be doubled by the year 2030. In PP-D, brain stops producing the neurotransmitter known as dopamine resulting in less ability to move and regulate emotions.[6] Neurobiological studies demonstrated that alexithymia is associated with dysfunctions of the frontal lobe and corpus callosum.[7] Neuropsychiatric issues such as cognitive impairment and dementia are common in PP-D which significantly deteriorates quality of life.[8,9] Emotion regulation difficulties in PP-D not only correlate with cognitive impairment but also with deteriorated quality of life, caregiver burden, non-adherence of medication and higher mortality rates.[10] Further research revealed that emotion deregulation is a significant predictor of cognitive decline over time in PP-D.[11] It is noteworthy that neural correlates of cognitive performance and alexithymia overlap, thus there might be an association between these variables. Frontal lobes are recruited by the brain during performance of simple and complex cognitive tasks.[12] For instance, patients have difficulties in fulfilling responsibilities of personal and professional life after bilateral ablation of frontal lobe.[13] Different cognitive demands utilize common regions of frontal lobe such as executive functions, emotion regulation, and conflict resolution.[14]

Neuro-imaging data demonstrated reduced bold responses of the frontal cortex in alexithymics as compared with healthy individuals.[15] To this end, the present study was designed to assess association between alexithymia and cognitive decline in PP-D. Further, to examine alexithymia as a determinant of cognitive performance in PP-D. To our knowledge, there is no study available which examined alexithymic attitudes and its contribution in cognitive impairment in PP-D. It was hypothesized that: (i) PP-D would show higher alexithymia than healthy individuals (ii) In contrast with healthy individuals, PP-D would show cognitive impairment (iii) Alexithymia would correlate with cognitive impairment (iv) Alexithymia would predict cognitive decline in PP-D.

MATERIAL AND METHODS

Sixty patients diagnosed with idiopathic PPD according to DSM-5 criteria[16] at Bahawal Victoria Hospital, Civil Hospital Bahawalpur and Nishter Hospital Multan Pakistan during May 2016 until June 2017 participated in the study. Sixty healthy individuals who were age and gender matched took part in the study from local community. Purposive sampling technique was used to collect data. Minimum sample size was 67 as calculated with A-priori sample size calculator for multiple regression with number of predictors = 2, anticipated effect size (f^2) = 0.15, probability level = 0.05. All participants were administered Mini Mental Parkinson to screen dementia ≤17/32[17] and Mini International Neuropsychiatric Interview to screen neuropsychiatric disorders.[18] This cross-sectional study was conducted after the approval by the board of studies of The Islamia University of Bahawalpur. All participants gave written informed consent. Participants completed Bermond-Vorst Alexithymia questionnaire (BVAQ)[19] and Montreal cognitive assessment (MOCA)[20] in a single testing session. Following, they were debriefed and thanked for their contribution to the study. Bermond-Vorst Alexithymia questionnaire was used as a measure of alexithymia. It is a 40-item statement questionnaire. Participants respond statements on 5-point Likert scale. There are five subscales which comprises cognitive and affective dimensions of alexithymia. Fantasizing and emotionalizing subscales are affective dimension whereas identifying, analysing and describing are cognitive dimension of alexithymia. Total score range is 40–200 while high scores represents higher alexithymia. Bermond-Vorst Alexithymia questionnaire is reliable and valid measure.[21]

Montreal cognitive assessment is used by clinicians as a quick (approx.10 minutes) device to assess cognitive impairment. A total score of 26/30 is considered normal. Tasks include executive, naming, attention, abstraction, delayed recall, orientation and language. MOCA has adequate reliability and validity in detection of cognitive impairment and dementia in P-D.[22] Descriptive statistics were used to analyse demographic characteristics of sample. Multivariate analyses of variance (MANOVA) was used to analyse group differences on BVAQ with dependent variables (fantasizing, emotionalizing, affective alexithymia, identification, analysing, describing, cognitive alexithymia, Total BVAQ scores) and Group as fixed factor. Separate MANOVA was conducted to assess group differences on MOCA scores with executive, naming, attention-digit task, attention-letter task, attention-calculation task, language, abstraction, delayed recall, orientation, Total MOCA scores as dependent and Group as fixed factor. Bivariate correlations were computed to assess association between dimensions of alexithymia and MOCA scores. Regression analysis was conducted to assess BVAQ, affective and cognitive dimensions of alexithymia as predictors of MOCA scores.

RESULTS

Demographic characteristics of sample are shown in table-1. Results of multivariate analysis of variance (MANOVA) showed significant effect of fantasizing F (1,118)= 1403.18, p<0.001, ηp^2=.92, emotionalizing F (1,118)= 1940.73, p<0.001, ηp^2=.94, affective alexithymia F (1,118)= 1989.47, p<0.001, ηp^2=.94, identification F (1,118)= 3894.00, p<0.001, ηp^2=.97, analysing F (1,118)= 4554.16, p<0.001, ηp^2=.97, describing F (1,118)= 3403.79, p<0.001, ηp^2=.96, cognitive alexithymia F (1,118)= 9449.74, p<0.001, ηp^2=.98, and total BVAQ F (1,118)= 8216.52, p<0.001, ηp^2=.98 (Table-2).

Multivariate analyses of variance on scores of MOCA (Table-3) revealed significant effect of executive F (1,118)= 3828.96, p<0.001, ηp^2=.97, naming F (1,118)= 3410.20, p<0.001, ηp^2=.96, attention-digit task F (1,118)= 1253.98, p<0.001, ηp^2=.91, attention-letter task F (1,118)= 383.50, p<0.001, ηp^2=.76, attention-calculation task F (1,118)= 4516.14, p<0.001, ηp^2=.97, abstraction F (1,118)= 1170.24, p<0.001, ηp^2=.90, delayed recall F (1,118)= 6973.93, p<0.001, ηp^2=.98, orientation F (1,118)= 6996.70, p<0.001, ηp^2=.98, and total MOCA scores F (1,118)= 36424.38, p<0.001,ηp^2=.99. Correlation analysis showed significant inverse correlation between MOCA scores, affective alexithymia (r = -.97, p<.001) and cognitive alexithymia (r = -.99, p<.001) as shown in table-4. Regression analysis revealed both dimensions of alexithymia are significant predictors of MOCA scores R^2=0.99, F (2, 119) = 5698.95, p<0.001, cognitive β= -.17, t= -4.86, p<0.01 and affective alexithymia β= - .82, t= - 22.86, p<.001.

Table-1: Characteristics of sample.

	PP-D	HC	
	(n=60) M±SD	(n=60) M±SD	
Age 50–66 years	60.28±4.08	60.33±3.68	t (59) = -.15, p=.87
Gender			
male	30	30	
Female	30	30	
Socioeconomic status			
High	20	20	
Middle	20	20	
Low	20	20	
Disease duration (2-8 years)	5.06 ± 1.43		

Note. PP-D= Patients with Parkinson's disease; HC= Healthy control individuals.

Table-2: Group differences on scores of Bermond-Vorst Alexithymia questionnaire

	PP-D		HC	
	M±SD	LB-UB	M±SD	LB-UB
Fantasizing	35.30±3.70	34.27–36.32	7.81±4.31	6.78–8.84
Emotionalizing	35.60±3.28	34.70–36.49	7.43±3.70	6.53–8.32
AA	72.21±5.60	70.46–73.97	16.25±7.94	14.49–18.00
Identification	34.71±3.33	34.09–35.33	7.18±0.74	6.56–7.80
Analysing	36.28±3.25	35.67–36.88	7.08±0.78	6.47–7.68
Describing	34.91±3.60	34.24–35.58	6.95±0.87	6.27–7.62
CA	105.81±6.59	104.59–107.03	21.21±1.37	19.99–22.43
Total BVAQ	177.96±8.93	175.79–180.13	37.46±8.01	35.29–39.63

Read PP-D as patients with Parkinson's Disease, HC as Healthy control individuals, M ± SD as Mean ± Standard deviation, AA as Affective Alexithymia, CA as Cognitive Alexithymia, BVAQ as Bermond-Vorst Alexithymia Questionnaire.

Table-3: Group differences on scores of Montreal Cognitive assessment

	PP-D		HC	
	M±SD	LB-UB	M±SD	LB-UB
Executive	0.45±0.50	0.34–0.55	4.93±0.25	4.83–5.03
Naming	0.16±0.37	0.09–0.23	3.00±0.00	2.93–3.06
A-DT	0.16±0.37	0.09–0.23	1.98±0.12	1.91–2.05
A-LT	0.1 ±0.34	0.07–0.19	1.00± 0.00	0.93–1.06
A-CT	0.08±0.27	0.02–0.14	2.96±0.18	2.90–3.02
Abstraction	0.10±0.30	0.02–0.17	1.91±0.27	1.84–1.99
DR	0.20±0.40	0.12–0.28	4.96±0.18	4.88–5.04
Orientation	0.36±0.48	0.27–0.46	5.96±0.18	5.87–6.06
Language	0.58±0.49	0.47–0.69	1.86±0 .34	1.75–1.96
MOCA Total	2.25±0.95	1.48–1.85	28.60±0.58	26.54–26.91

Read PP-D as patients with Parkinson's Disease, HC as Healthy control individuals, M ± SD as Mean ± Standard deviation, A-DT as Attention-Digit task, A-LT as Attention- Letter task, A-CT as Attention-Calculation task, DR as Delayed Recall, MOCA as Montreal Cognitive Assessment.

Table-4: Correlations between scores on Bermond-Vorst Alexithymia questionnaire and montreal cognitive Assessment

	AA	CA	Total MOCA
AA	-	r = .96*, *p*<.001	r = -.97*, *p*<.001
CA	r = .96*, *p*<.001	-	r = -.99*, *p*<.001
Total MOCA	r = -.97*, *p*<.001	r = -.99*, *p*<.001	-

*Correlations are significant at *p*<.001. Read AA as Affective Alexithymia, CA as Cognitive Alexithymia, MOCA as Montreal Cognitive Assessment

DISCUSSION

The current study was designed to assess association between components of alexithymia and cognition. A comparison between PP-D and healthy individuals was conducted on components of alexithymia and cognitive performance. Results of the current study suggested that both subject groups had a differential performance. PP-D showed higher alexithymic attitudes as compared with HC.

Both dimensions (affective and cognitive) were higher in PP-D than HC. Further results confirmed that PP-D were impaired on cognitive tasks in contrast with HC. It was also found that affective and cognitive dimensions of alexithymia were inversely correlated with cognitive performance. Moreover, both dimensions were significant predictors of cognitive performance. Higher alexithymia correlated with cognitive decline in PP-D. Previously, presence of alexithymia in patients with Parkinson's disease has been reported.[4] However, the present study for the first time demonstrated alexithymic attitudes in PP-D of south-Punjab in Pakistan. Neural correlates of alexithymia suggested that frontal lobe deficits are related with alexithymia.[4] Results of the present study also supported these findings as PP-D showed deficient performance on cognitive tasks. Frontal lobe is involved in cognition[12], therefore frontal lobe related cognitive deficits and alexithymia in PP-D has been observed in the present study.

On contrary, healthy individuals were not deficient in cognitive performance. In addition, HC did not show alexithymic attitudes. These findings were further supported by correlation analysis where affective and cognitive dimensions of alexithymia were inversely associated with cognitive performance. Higher alexithymic attitudes were related with cognitive

decline. Prevalence of neuropsychiatric symptoms is common in PP-D.[23] Recent review of neuropsychological studies revealed that cognitive deficits and neuropsychiatric symptoms were related with frontal lobe atrophy in PP-D.[24] Alexithymia in neurodegenerative disorders are associated with gray matter atrophy in frontal regions, for instance anterior cingulate cortex.[25]

Degeneration in frontal-subcortical regions brings changes in behaviour, emotion, and cognition.[26] Deficits in mirror neuron system has been observed in alexithymics which is crucial for human emotion processing, learning and self-awareness. Impaired mirror neuron system is related with dysfunctions of the parietal cortex.[27] This might be the reason that cognitive deficits and alexithymia were apparent in PP-D. However, future studies must explore neural correlates of mirror neurons in PP-D.

CONCLUSION

Affective and cognitive alexithymia are significant markers of cognitive decline in PP-D.

Recommendations: Results of the current study have implications for better care of PP-D. It is recommended that alexithymia should be assessed in PP-D for an early detection of cognitive decline and further deterioration can be prevented with patient rehabilitation and therapeutic intervention.

Limitations of the study:

The current study had a small sample. Variables must be examined with larger sample size.

Conflict of Interest: Authors have no conflict of interest.

AUTHORS' CONTRIBUTION

AG: Study design, data collection, data analysis, data interpretation, write-up and proof reading. JY: Data collection, data analysis.

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