Spatial Relation Disorder in Case of Kashmiri Speaking Alzheimer's Disease Patients

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Abstract

There are many linguistic aspects which get shattered by Alzheimer's disease. Similarly spatial relation gets impaired among AD patients. The present study is an attempt to document Spatial Relation found in Urdu Speaking Kashmiri Alzheimer's disease (AD) patients using cross-sectional design. Forty mild–moderate–advanced AD patients and 30 controls matched for age, gender and education completed a simple picture recognition task will be considered for the present study. Cross-sectional comparisons in the present study indicated that mild–moderate AD patients produced more errors in spatial positions than control group.

Keywords: Alzheimer's disease, Spatial Relation, Meta-linguistic, language

Background

Alzheimer's disease (AD), also known simply as *Alzheimer's*, is a neurodegenerative disease characterized by progressive cognitivedeterioration   together   with   declining   activities   of   daily   living and neuropsychiatric symptoms or behavioral changes. The most striking early symptom is loss of short-term memory (amnesia), which usually manifests as minor forgetfulness that becomes steadily more pronounced with illness progression, with relative preservation of older memories.

Alzheimer's disease (AD) affects older people's memory, thought and behavior. AD progresses inexorably, causing individuals with the condition to gradually forget knowledge acquired throughout life and interfering with recall of even the simplest among everyday activities. Eventually patients will end up forgetting even the names of their family members. While the majority of scientists hold the belief that AD is not a normal part of aging, considerable debate still surrounds the issue. Alzheimer's disease disrupts critical metabolic processes that keep neurons healthy. These disruptions cause nerve cells in the brain to stop working, lose connections with other nerve cells, and finally die. The destruction and death of nerve cells causes the memory failure, personality changes, problems in carrying out daily activities, and other features of the disease.

Objective

This paper will attempt to look at the effect of Alzheimer's disease on the patient's concept and perception of Spatial Relation system in second language i.e, Urdu Language.

Epidemiology

The most important risk factors for AD are old age and a positive family history. The frequency of AD increases with each decade of adult life, reaching 20–40% of the population over the age of 85. A positive family history of dementia suggests a genetic cause of AD, although autosomal dominant inheritance occurs in only 2% of patients with AD. Female sex may also be a risk factor independent of the greater longevity of women.

Pathology

At autopsy, the earliest and most severe degeneration is usually found in the medial temporal lobe (entorhinal/perirhinal cortex and hippocampus), lateral temporal cortex, and nucleus basalis of Meynert. The

characteristic microscopic findings are neuritic plaques and NFTs. These lesions accumulate in small numbers during normal brain aging but dominate the picture in AD.

Methodology

A random sample of forty cases of clinically diagnosed Alzheimer's disease patients and thirty normal people as control group are considered for the present study. The data were collected from Shri Maharaja Hari Singh Hospital, and some of them were met personally at their home. These subjects were outdoor patients of my Co-Guide Dr. Parvaiz Ahmad Shah, Head of Neurology, SMHS and continuing their treatment from home. The subjects were in the age group 50 to above 90 years. These forty subjects, upon whom tests were administered, were considered for further study.This paper deals with the analysis of the forty subjects, who suffered neuro-degeneration to the different parts of the brain and were able to respond to the tests, along with the thirty subjects as normal control group. On the basis of the medical reports, all subjects under study are categorized into three groups: Mild AD, Moderate AD, and Advanced AD. Out of forty cases, 15 cases were Mild AD cases, 14 were AD Moderate and 11 were Advanced AD patients.

Test Batteries for Language Deficit

 Since the present study is focused on Linguistic Profiling of Alzheimer's disease rather than Dementia, it was decided to perform a simple Kashmiri and Urdu bilingual Test with focus on language deficit in production, comprehension, picture naming and picture recognition abilities in Urdu language.

Phonologically patterned structures was given to both groups. Spatial relation test includes 18 pictures of different objects at various positions and 5 marks are allotted to each correct response. Scoring is done on the basis of Five point Scale.

Bar representation of spatial relation test results of male and female AD subjects spatial relation test in case of male AD subjects
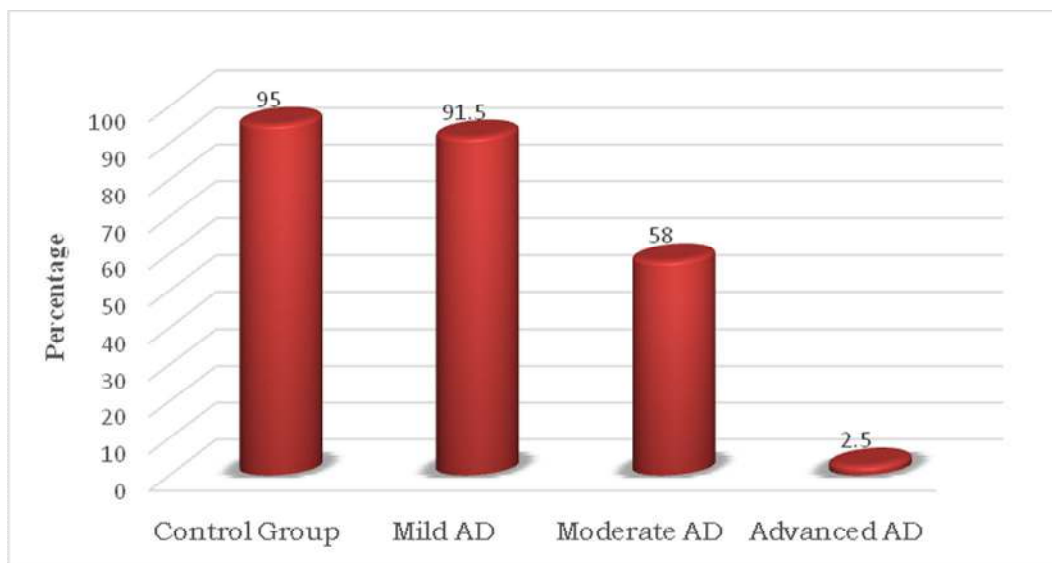

Fig 1: *Percent Scores showing Spatial Relation difficulty among Mild, Moderate and Advanced Male AD Patients.*

From the bar chart presented above the following tentative conclusions can be drawn-

1.As compared to Control Group, Mild AD subjects show better performance than the other two groups (Moderate Alzheimer's disease and Advanced Alzheimer's disease) in Urdu Spatial Relation test (91.5%) and shows a deficit of 4%.

2. As compared with the Mild AD group, Moderate AD group shows a deficit of 33.5% in Urdu Spatial Relation and around 37% in Urdu Spatial Relation test while comparing with the performance of Normal Control Group.
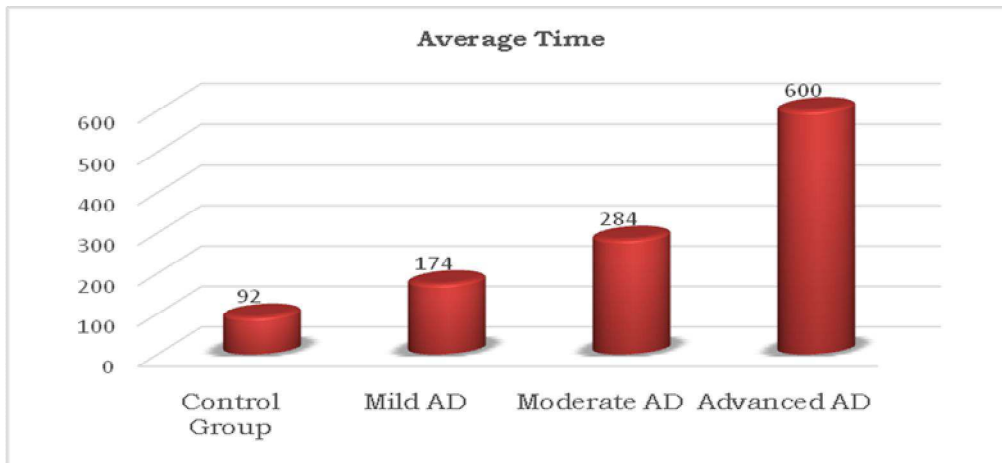

Fig 2: Average Time taken by Mild, Moderate and Advanced Male AD Patients in case of Spatial Relation Test.

From the bar chart presented above the following tentative conclusions can be drawn-

1. The span of the time increases as we move from Control group to Advanced AD subjects. The time taken by the control Group for the completion of Urdu Spatial Relation Test is 92 seconds.

2.The time taken by the Mild AD, Moderate AD and Advanced AD subjects for the completion of Urdu Spatial Relation test is 174, 284 and 600 seconds respectively.

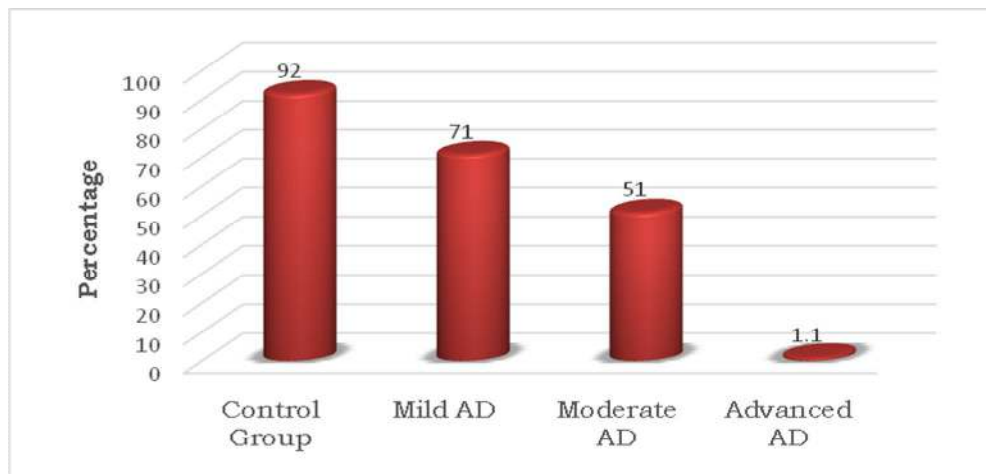**Spatial relation test in case of female AD subjects**

Fig 3: Percent Scores showing Spatial Relation difficulty among Mild, Moderate and Advanced female AD Patients.

From the above bar chart presented above the following tentative conclusions can be drawn-

1.As compared to Control Group, Mild AD subjects show better performance than the other two groups (Moderate Alzheimer's disease and Advanced Alzheimer's disease) in Urdu Spatial Relation test (71%) and shows a deficit of 21%.

2.As compared with the Mild AD group, Moderate AD group shows a deficit of 30% in Urdu Spatial Relation and around 41% in Urdu Spatial Relation test while comparing with the performance of Normal Control Group.

3.Mild and Moderate AD group shows better performance in Urdu Spatial relation because of the influence of Urdu in day-to-day life.
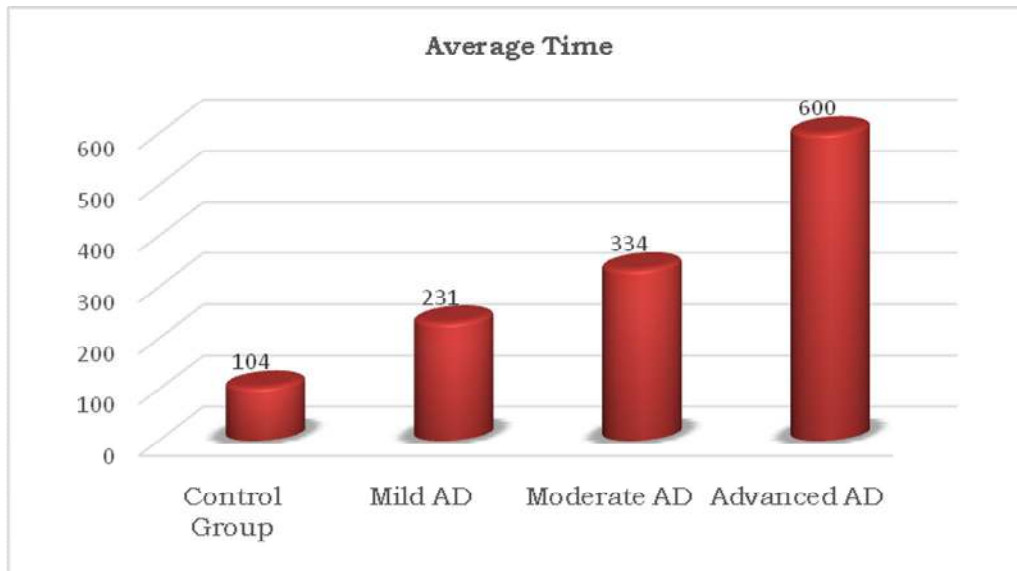

Fig 4: *Average Time taken by Mild, Moderate and Advanced female AD Patients in case of Spatial Relation Test.*

From the bar chart presented above the following tentative conclusions can be drawn-

1.The span of the time increases as we move from Control group to Advanced AD subjects. The time taken by the control Group for the completion of Urdu Spatial Relation Test is 104 seconds.

2.The time taken by the Mild AD, Moderate AD and Advanced AD subjects for the completion of Urdu Spatial Relation test is 231, 334 and 600 seconds respectively. The time taken generally corresponds to the severity of cases. Lesser the severity lesser is the time taken and more the severity more is the time taken.
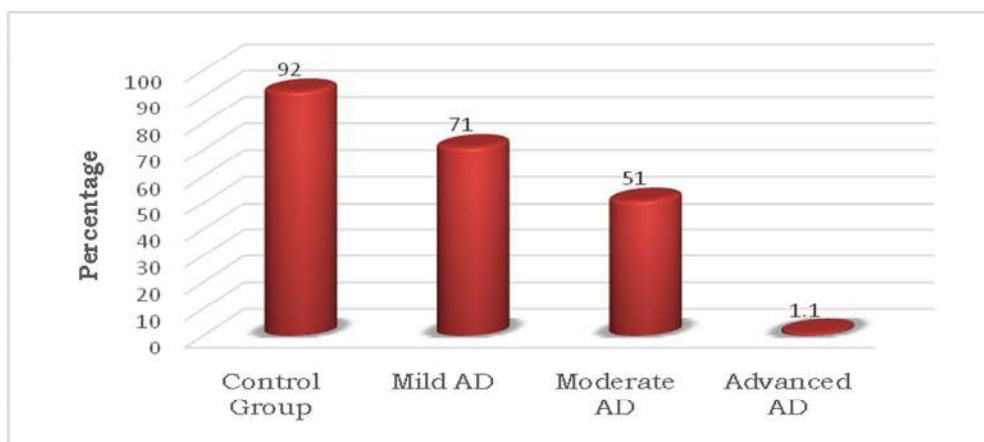

Fig 5: *Percent Scores showing Spatial Relation difficulty among Mild, Moderate and Advanced female AD Patients.*

From the bar chart presented above the following tentative conclusions can be drawn-

1. As compared to Control Group, Mild AD subjects show better performance than the other two groups (Moderate Alzheimer's disease and Advanced Alzheimer's disease) in Urdu Spatial Relation test (71%) and shows a deficit of 21%.
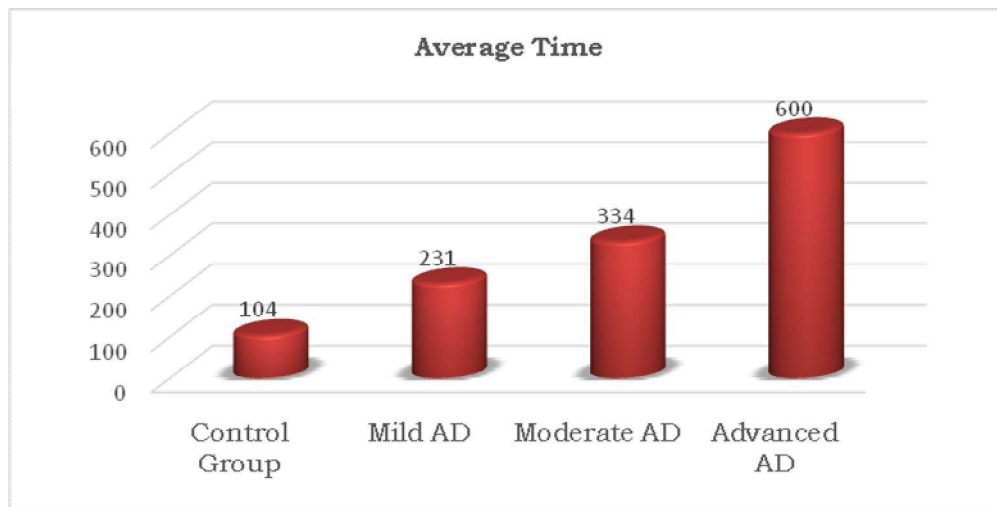

Fig 6: Average Time taken by Mild, Moderate and Advanced female AD Patients in case of Spatial Relation Test.

From the bar chart presented above the following tentative conclusions can be drawn-

1.The span of the time increases as we move from Control group to Advanced AD subjects. The time taken by the control Group for the completion of Urdu Spatial Relation Test is 104 seconds.

2.The time taken by the Mild AD, Moderate AD and Advanced AD subjects for the completion of Urdu Spatial Relation test is 231, 334 and 600 seconds respectively. The time taken generally corresponds to the severity of cases. Lesser the severity lesser is the time taken and more the severity more is the time taken.

Satistical procedure: Out of various softwares available for the statistical analysis, SPSS (Statistical software for social sciences) is used for the statistical analysis of data. For the data analysis in present study, SPSS used. The statistical technique namely Distance Correlation is used to determine the association between the variables in the form of distances, more the distance far the variables are from each other and vice versa.

Discussion on Distance correlation results

The distance correlation displays Bar graphs based on Case summaries and Proximity matrix of Spatial Relation Test:

The SPSS output for distance correlation in case of urdu spatial relation disorder among male mild, moderate and advanced AD groups and discussion on correlation results.

Proximity matrix showing Distance Correlation in Case of Urdu Spatial Relation Test

Table 1

PROXIMITY MATRIX

	Euclidean Distance			
	Control Group	Mild AD	Moderate AD	Advanced AD
Control Group	0	5.895	39.424	93.528
Mild AD	5.895	0	35.405	90.135
Moderate AD	39.424	35.405	0	56.985
Advanced AD	93.528	90.135	56.985	0

Table 1 is called a Proximity matrix/Distance Matrix/ Dissimilarity Matrix which is used to predict the differences in the variables, more value between the variables corresponds to the severity of the case.
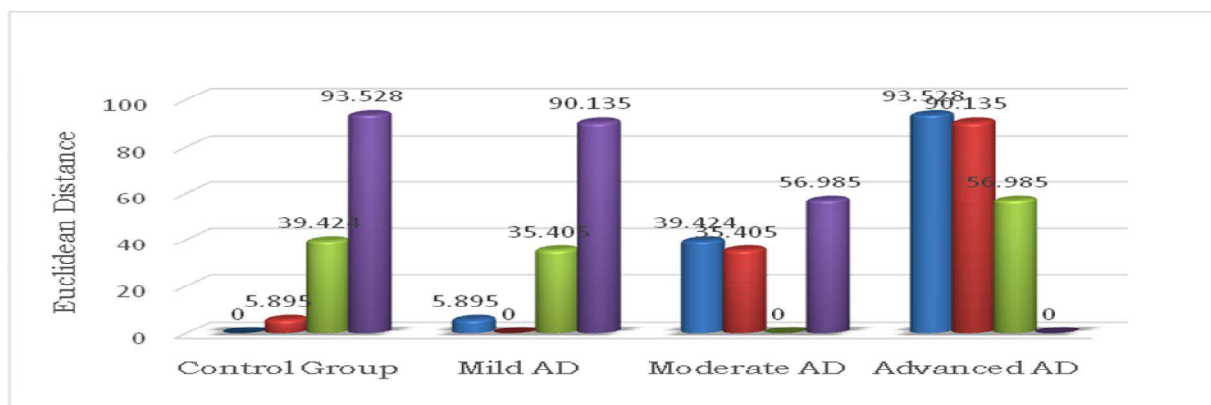

Fig 7: Euclidean distance showing difference between Mild, Moderate andAdvanced Male AD Patients in case of Urdu Spatial Relation Test.

From the table and the bar chart given above, the following conclusions can be drawn:

1.The performance of Control group and Mild AD subjects are almost similar with a minimum Euclidean distance of 5.8 between them in Urdu Spatial Relation test. Hence, the Mild AD subjects have satisfactory control over Spatial Judgement.

2.In case of Moderate AD and Advanced AD subjects, there is a drastic fall of result which leads to increase in Euclidean distance. Hence, there is a visible loss of control over spatial judgement.

Proximity matrix showing Distance Correlation in Case of Urdu Spatial Relation Test

Table 2

PROXIMITY MATRIX

	Euclidean Distance			
	Control Group	Mild AD	Moderate AD	Advanced AD
Control Group	0	30.183	48.267	105.961
Mild AD	30.183	0	21.639	76.917
Moderate AD	48.267	21.639	0	58.189
Advanced AD	105.961	76.917	58.189	0

Table 2 is called a Proximity matrix/Distance Matrix/ Dissimilarity Matrix which is used to predict the differences in the variables, more value between the variables corresponds to the severity of the case. Whereas, 0 value indicates that variable are same.
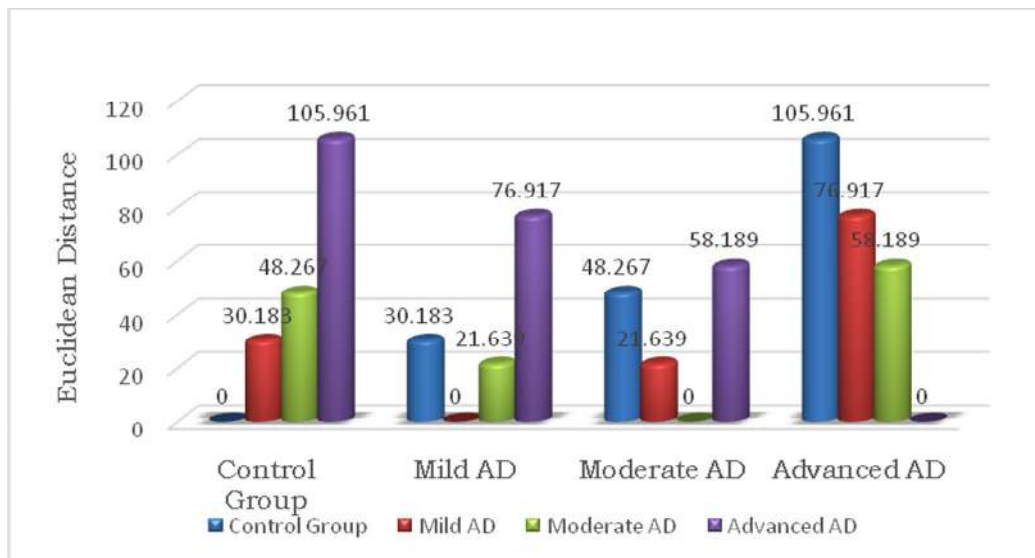

Fig 8: Euclidean distance showing difference between Mild, Moderate and Advanced Female AD Patients in case of Urdu Spatial Relation Test.

From the table and the bar chart given above, the following conclusions can be drawn:

1.As compared to the control group, Mild AD group shows better performance than other two groups (Moderate and Advanced AD subjects) in Urdu Spatial Relation test. Hence, the Mild AD subjects have satisfactory control over Spatial Judgement.

2.In case of Moderate AD and Advanced AD subjects, there is a drastic fall of result which leads to increase in Euclidean distance. Moreover. The Advanced group has maximum loss of control over spatial judgement.

Conclusion

Our findings support the view that spatial relation occurs early in AD and progresses gradually from Mild to Advanced stage of AD. Patients with Moderate AD showed significant loss of spatial relation abilities relative to controls and produced a variety of errors. Results also demonstrate that time is directly proportional to severity of disease i.e., lesser severity lesser is the time taken and vice-versa. Whereas, patients with Advanced AD

showed almost complete loss of spatial relation ability due to the severity of disease. Moreover, results also show that male AD subjects show better performance in Spatial Relation Test as compared to female AD subjects.

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