

STATISTICAL ANALYSIS OF WORD RETRIEVAL IMPAIRMENT IN KASHMIRI-URDU BILINGUAL ALZHEIMER'S DISEASE PATIENTS

DEEBA AAZFA

Ph.D Student, Department of Linguistics, University of Kashmir

ABSTRACT

Dementia of the Alzheimer's type, is a dementia with an insidious onset and gradual progression. Various patterns of deficits are seen, but the disorder begins most commonly with deficits in recent memory, which are followed by aphasia, apraxia, and agnosia after several years. There are many linguistic aspects which get shattered by Alzheimer's disease. These include patient's meta-linguistic aspects of his/her language. Similarly color recognition, number system and naming system get impaired among AD patients. The present study is an attempt to document Word retrieval deficiency/Anomia found in Kashmiri Speaking 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 picture recognition than control group. While as advanced AD patients have maximum word retrieval deficiency. This paper will attempt to look at the effect of Alzheimer's disease on the patient's concept and perception of language's naming system.

KEYWORDS: Alzheimer's Disease, Anomia, Deficiency, Language, Naming-System, Perception

INTRODUCTION

Background

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 Word Retrieval system and to check whether there is any Phonological/Phonetic disorder.

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 gender 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. The subjects were in the age group 60 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 were given to both groups. The bilingual phonological test includes 65 pictures (objects, animals, parts of body) and 2 marks are allotted for each correct response (2 for Urdu). The present paper is focused on Anomia in Urdu Language.

Bar Representation of Anomia Test Results of Male and Female Ad Subjects

Anomia Test/ Picture Recognition Test in Case of Male Ad Subjects

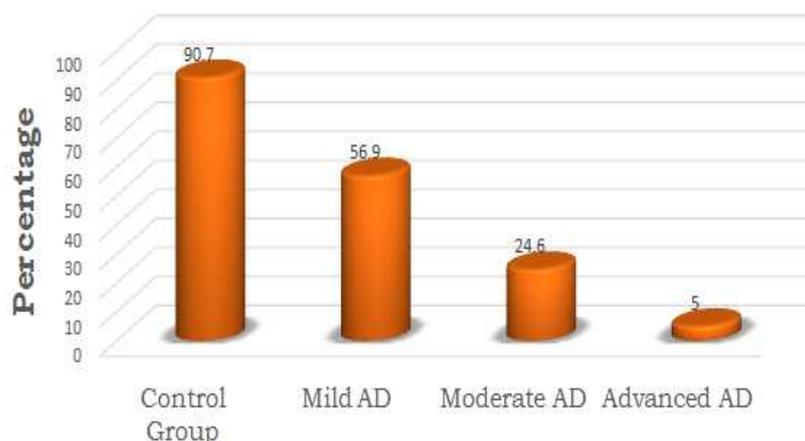


Figure 1: Percent Scores Showing Anomia/Picture Recognition Difficulty among

Mild, Moderate and Advanced Male AD Patients

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

- 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 Anomia test (56.9%) and shows a deficit of 33.8%.
- As compared with the Mild AD group, Moderate AD group shows a deficit of 32.3% in Urdu Anomia test and around 66% in Urdu Anomia test resp. while comparing with the performance of Normal Control Group.
- Advanced AD group shows maximum deficit of almost 85.7% in Urdu Anomia test as compared to Normal Group. The scores generally corresponds to the severity of cases.

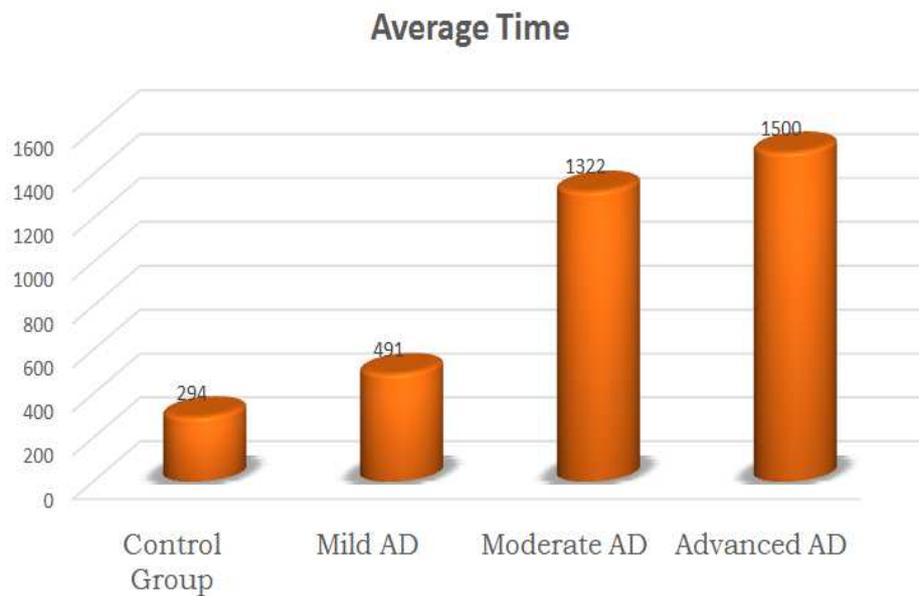


Figure 2: Average Time Taken by Mild, Moderate and Advanced Male AD Patients in Case of Anomia/Picture Recognition Test

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

- 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 Anomia Test is 294 seconds.
- The time taken by the Mild AD, Moderate AD and Advanced AD subjects for the completion of Urdu Anomia test is 491, 1322 and 1500 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.

Anomia Test/ Picture Recognition Test in Case Of Female Ad Subjects

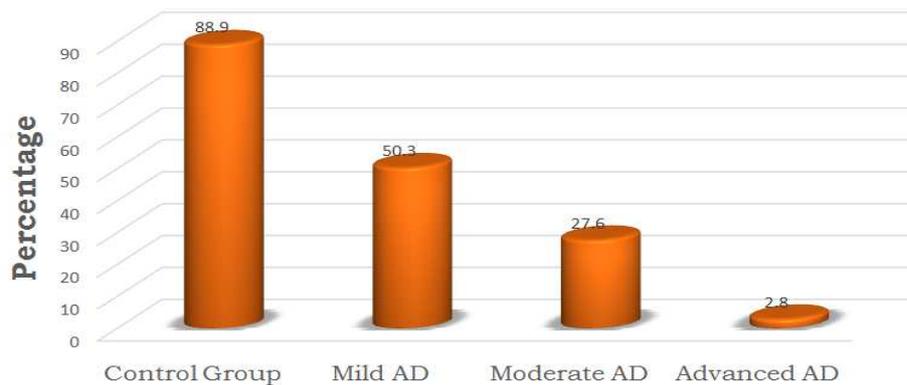


Figure 3: Percent Scores Showing Anomia/Picture Recognition Difficulty Among mild, Moderate and Advanced Female AD Patients

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

- 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) shows a deficit of 33.5% and 33.6% respectively.
- As compared with the Mild AD group, Moderate AD group shows a deficit of 22.7% in Urdu Anomia test and around 61.3% Urdu Anomia test resp. while comparing with the performance of Normal Control Group.

Average Time

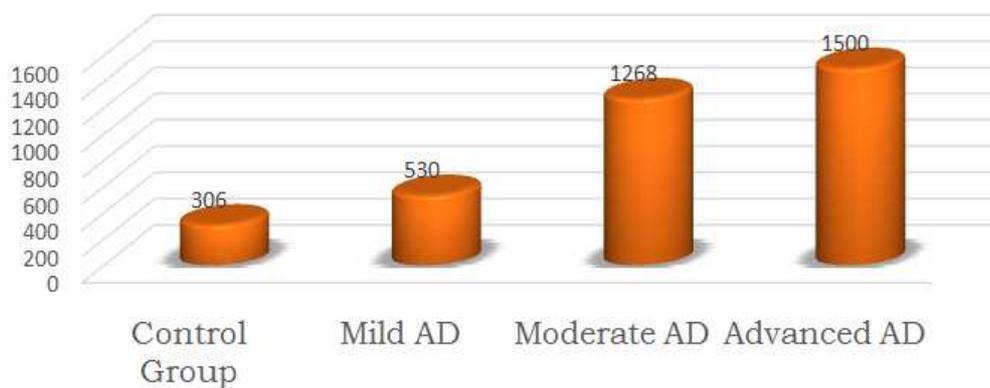


Figure 4: Average Time Taken by Mild, Moderate and Advanced Female AD patients in Case of Anomia/ Picture Recognition Test

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

- 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 Anomia Test is 306 seconds.
- The time taken by the Mild AD, Moderate AD and Advanced AD subjects for the completion of Urdu Anomia test is 530, 1268 and 1500 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.

Statistical 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.

DISCUSSIONS ON DISTANCE CORRELATION RESULTS

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

THE SPSS OUTPUT FOR DISTANCE CORRELATION AMONG MALE MILD, MODERATE AND ADVANCED AD GROUPS AND DISCUSSION ON CORRELATION RESULTS

Table 1

Case Summaries				
	Control Group	Mild Ad	Moderate Ad	Advanced Ad
Mean	59.1667	36.75	15.7	1.6
Std. Deviation	3.35765	3.40221	5.23927	1.14018
Time	295	490	1322	1500

Table 1 indicates that the average score taken by a Control Group in Urdu Anomia test is 59 while as score taken by the Subjects in Mild, Moderate and Advanced Stage are 36.7, 15.7 and 1.6 respectively, also the time taken by a Control Group person in this test is 295 seconds while as time taken by Subjects in Mild, Moderate and Advanced Stage are 490, 1322 and 1500 seconds respectively.

Table 2

Proximity Matrix				
	Euclidean Distance			
	Control Group	Mild AD	Moderate AD	Advanced AD
Control Group	0	49.525	98.716	129.381
Mild AD	49.525	0	50.075	80.139
Moderate AD	98.716	50.075	0	33.44
Advanced AD	129.381	80.139	33.44	0

Table 2 is called a Proximity matrix/Distance Matrix/ Dissimilarity Matrix which is used to predict the differences in the variables, more the value between the variables more the variables are far from each other, lesser values shows closeness of the variables, even zero value indicate the similar variables.

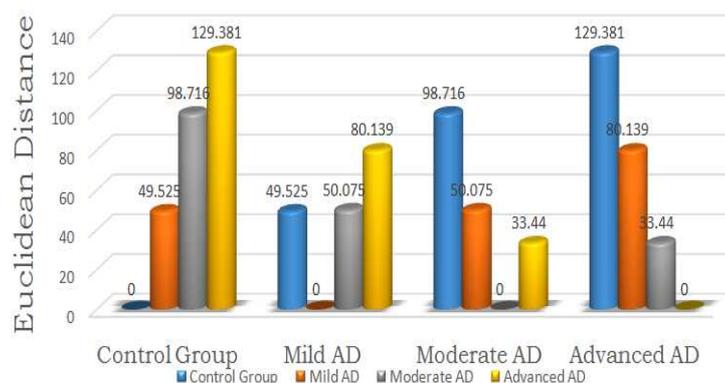


Figure 5: Euclidean Distance Showing Difference between Mild, Moderate and Advanced Male AD Patients in Case of Urdu Anomia Test

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

- Mild AD subjects have better performance in Urdu Anomia test as compared to Moderate AD and Advanced AD subjects. Hence, there is an evident word retrieval deficiency.
- As compared to Control Group, the Euclidean distance shows increase from Mild AD to Moderate AD and from Moderate AD to Advanced AD subjects.

PROXIMITY MATRIX AND CASE SUMMARIES SHOWING DISTANCE CORRELATION IN CASE OF URDU ANOMIA TEST AMONG FEMALE AD SUBJECTS

Table 3

Case Summaries				
	Control Group	Mild Ad	Moderate Ad	Advanced Ad
Mean	57.8	32.6667	18.0625	1.8333
Std. Deviation	2.38896	2	5.37479	1.16905
Time	305	530	1268	1500

Table 3 indicates that the average score taken by a Control Group in Urdu Anomia test is 57.8 while as score taken by the Subjects in Mild, Moderate and Advanced Stage are 32.6, 18 and 1.8 respectively.

Table 4

Proximity Matrix				
	Euclidean Distance			
	Control Group	Mild Ad	Moderate Ad	Advanced Ad
Control Group	0	65.253	94.011	138.676
Mild AD	65.253	0	29.223	73.58
Moderate AD	94.011	29.223	0	45.122
Advanced AD	138.676	73.58	45.122	0

Table 4 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.

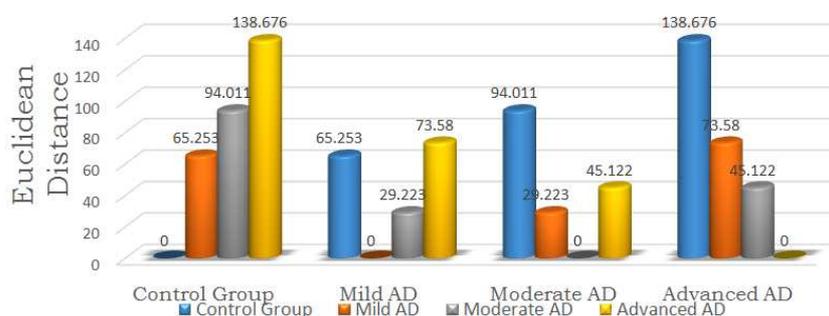


Figure 6: Euclidean Distance Showing Difference between Mild, Moderate and Advanced Female AD Patients in Case of Urdu Anomia Test

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

- Mild AD subjects have better performance in Urdu Anomia test as compared to Moderate AD and Advanced AD

subjects. Hence, there is an evident amassed word retrieval deficiency.

- As compared to Control Group, the Euclidean distance shows increase from Mild AD to Moderate AD and from Moderate AD to Advanced AD subjects.

CONCLUSIONS

Our findings support the view that anomia occurs early in AD and progresses gradually from Mild to Advanced stage of AD. Patients with Moderate AD showed significant loss of word retrieval 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 word retrieval ability due to the severity of disease. Moreover, results also show that male AD subjects show better performance in Urdu Anomia Test as compared to female AD subjects. It was hypothesized there might be the Phonological/Phonetic Disorders which may include phoneme addition, phoneme deletion, phoneme substitution etc. This hypothesis was not supported by the results. Phonology/Phonetic Disorder remained intact by all speakers at all stages of AD.

REFERENCES

1. Kogure D, Matsuda H, Ohnishi Tet al. Longitudinal evaluation of early Alzheimer's disease using brain perfusion SPECT. *J Nucl Med* 2000; 41:1155–62.
2. Vander Flier WM, vanden Heuvel DMJ, Weverling-Rijns-burger AWE et al. Cognitive impairment in AD and mild cognitive impairment is associated with global brain damage. *Neurology* 2002; 59:874–9.
3. Pike, K. E.; Rowe, C. C.; Moss, S. A.; Savage, G. Memory profiling with paired associate learning in Alzheimer's disease, mild cognitive impairment, and healthy aging. *Neuropsychology*, Vol 22(6), Nov 2008, 718-728.
4. Antoine C, Antoine P, Guernonprez P, Frigard B. Awareness of deficits and anosognosia in Alzheimer's disease. *Encephale*. 2004; 30(6):570–7.
5. Cruz VT, Pais J, Teixeira A, Nunes B. The initial symptoms of Alzheimer disease: caregiver perception. *Acta Med Port*. 2004; 17(6):435–44.
6. Roan S (August 9, 2010). "Tapping into an accurate diagnosis of Alzheimer's disease". *Los Angeles Times*.
7. Santibáñez M, Bolumar F, García AM. Occupational risk factors in Alzheimer's disease: a review assessing the quality of published epidemiological studies. *Occupational and Environmental Medicine*. 2007; 64 (11):723–732.
8. Gaugler JE, Kane RL, Kane RA, Newcomer R. Early community-based service utilization and its effects on institutionalization in dementia caregiving. *Gerontologist*. 2005; 45(2):177–85.
9. Venneri A, Forbes-Mckay KE, Shanks MF. Impoverishment of spontaneous language and the prediction of Alzheimer's disease. *Brain*. 2005; 128(Pt 4):E27.
10. Cheryl L. Stopford, Jennifer C. Thompson, David Neary, et al. Working memory, attention, and executive function in Alzheimer's disease and front-temporal dementia. *Cortex*, Volume 48, Issue 4, April 2012, Pages 429–446

