International Journal of Health Sciences and Research
www.ijhsr.org ISSN: 2249-9571

Original Research Article

Language Preferences and Attrition in Bilingual Persons with Dementia

Dr. Deepa M.S.[1], Shyamala K. Chengappa[2]

[1]Professor& Principal Naseema Institute of Speech and Hearing Koramangala, Bangalore, Bangalore University
[2]Former Professor of Language Pathology Dept. of Speech-Language Pathology All India Institute of Speech and Hearing University of Mysore, Mysore

Corresponding Author: Dr. Deepa M.S.

ABSTRACT

Introduction: Dementia is one of the neurodegenerative disorders which generally affect elderly causing progressive deteriorations of all the acquired skills such as language, cognition, personality etc. This disease can show differential impairment in bilingual individuals as compared to monolinguals since the accessibility and use of verbal communication varies in them. The difficulty varies with respect to use of number of languages and the proficiency in these languages. There is a need to study the effect of each language in the linguistic competence in such individuals.
Aim of the study: Present study aimed at assessing the effectiveness of use of two languages by bilingual (Kannada/English) elderly people with dementia using Bilingual Aphasia Test (BAT).
Method: The study consisted of 20 participants, 10 persons with mild dementia (PWD) and 10 healthy elderly (HE). Included for the study were two test protocols for assessing cognitive linguistic skills in elderly population. Assessment of the effectiveness in linguistic levels and skills in two languages (Kannada and English) was performed using Part C (Bilingual portion) of Bilingual Aphasia Test (BAT by Paradis & Rangamani, 1989).
Results & Discussion: Paired sample t test was administered for HE to check the effect of language on all the tasks in BAT. Independent sample t test was administered between the groups to compare the linguistic measures including WR (Word Recognition), WT (Word Translation), ST (Sentence Translation), GJ (Grammaticality Judgment), and GJC (Grammaticality Judgment Correction). There was significant group effect in the performances. Few parameters clearly differentiated the group and few did not.
Conclusion: To conclude, in bilingual persons with dementia, regression to a primary language may be associated with development of cognitive impairment. Participants with dementia failed to differentiate that they were using two distinct languages at several conditions strongly indicating the retreating of bilingual competence into monlingualism.
Key words: Bilingualism, Dementia, Language abilities.

INTRODUCTION

Life expectancies have increased significantly during the past century which has resulted in more elderly people in the social spectrum with improved health systems. Effective communication is central to an older person's wellbeing. It involves the adequate production and reception of a message, congruity between the message sent and the message received in the environment in which his/her interactions are valued and reinforced. On the other hand, as people age, there exists difficulty in understanding as well as remembering spoken and written language. Hence it is prerequisite to the understanding of the cognitive processing involved in language production and comprehension. In using language one has to draw on the abilities to encode information, to store information

over short or long periods of time, and to retrieve the information at the time of speaking. If older individuals have difficulty in one or more of these stages, it would be reflected as changes in their ability to use language, either as a listener or as a speaker. [1]

While some of these difficulties can be due to sensory impairments (such as, hearing and vision), and others could be because of deficits in cognitive processes (such as memory, attention & concentration, abstract reasoning, judgment etc.)

A range of cognitive processes reportedly slow down with age. Changes occur in the ability to coordinate language abilities with cognitive skills. This is because language depends on cognitive components such as perception, attention, reasoning and memory. Memory is considered to be the core of cognition. When healthy elderly face deficits of cognitive- linguistic skills it is likely to be exaggerated in adults with neurogenic communication disorders which encompass a variety of specific abnormalities all caused by nervous system pathology. Their features, severity and outcome reflect the location, magnitude and nature of the abnormality. And these deficits emerge as dynamic and range from subtle to severe. Present study is primarily based on dementia.

Dementia is a debilitating condition that causes chronic and progressive deterioration in intellect, personality and communication functioning. There are many varied causes of dementia, among them, are infections, anoxia, intracranial masses, trauma, toxicity, hearing and visual disorders, vitamin deficiencies, endocrine and metabolic disorders, arteriosclerotic complications and Alzheimer's and other disorders. [2]

The early stage of dementia lasts from two to four years. The symptoms observed during early stage include difficulty in handling finances, memory problems, reduced competence in cognitive tasks, and decreased awareness of recent events.[3] Early noticed symptoms of dementia is a problem with episodic memory and working memory which deteriorate with the progression of the disease. This will in turn reduce the efficiency of encoding and decoding information. Individuals have difficulty in attention [4,5] and memory which is attenuated in some individuals.

It is mentioned by several authors that persons with mild to moderate dementia exhibit intact phonology, syntax and semantic knowledge while semantic and pragmatic knowledge may be significantly impaired.[6,7] Apart from these linguistic analysis in dementia there were also studies which assessed the pattern of reduction in language in bilingual context. [8-11] Communication abilities and the pattern of this reduction in bilingual persons affected with dementia are rarely documented and have not been interest to authors. However few suggest that the ability to maintain fluency in many languages reduce with increasing age.

An evaluation of elderly individuals revealed that those who spoke two languages had been diagnosed with Alzheimer's 4.3 years later and reported the start of symptoms five years later than those who spoke only one language. [12,13] Reported that multilingualism acts as a protection against development of Alzheimer's but no significant benefit for those who spoke two languages [14] stated that, bilingualism may not eradicate dementia but may help retain the cognitive reserve of the individuals.

Procedures commonly assessment procedures for dementia may not be employed for bilingual situation.[10] Demonstrated that potential contribution related to the assessment carried out in the language of choice during L2 setting.

Deterioration of language during normal aging has been reported by several authors and has been compared with certain aphasic disorders. [9] Examined the advantage of using Bilingual Aphasia Test (BAT) for typical bilingual people to

examine the preserved and declined linguistic abilities in both the languages. Results show that bilingual elderly participants exhibited deterioration in both the languages equally. [15]

Demonstrated impaired naming ability in both languages known in bilingual persons with dementia. However, oral reading ability was most impaired in one language followed by irregular words in other language. The patients could recognize one language and exhibited disturbances of lexical comprehension and lexical decision in another language. These results may reflect different patterns in language deterioration as AD progresses.[16]

Reported research investigated the influence of bilingualism cognitive and linguistic performance across the life span. According to them bilingualism shows both advantages and disadvantages. Bilingual individuals show reduced formal language proficiency than monolinguals however they exhibited heightened executive control in nonverbal tasks requiring conflict resolution.[17] Inferred that *potential differences between bilinguals and monolinguals in age-associated cognitive decline during normal and abnormal aging.* [18] Hypothesized that implicit language processing is more impaired than explicit language processing in Parkinson's disease.

Present study aimed at assessing the effectiveness of use of two languages by bilingual (Kannada/English) elderly people with dementia using Bilingual Aphasia Test (BAT).The study also examined performance in each language condition for the similar task difficulty.

METHOD

Sample

The study consisted of 20 participants, 10 persons with diagnosis of mild dementia and 10 healthy elderly. The age range of the participants was 71-86 years. The group of persons with dementia (PWD) comprised of bilingual (Kannada-English) persons suffering with mild dementia as measured by the Mini-Mental Status Examination.[19] A diagnosis of probable dementia was made according to DSM IV criteria. Majority of the participants attended a geriatric clinic at National Institute of Mental Health and Neurosciences (NIMHANS) where they underwent thorough medical screening in order to rule out any other treatable pathology that could explain their impairment. This included neuropsychological assessment, laboratory blood testing and Computerized Tomography (CT) scanning of the head. Few patient participants were taken from Nightinghales Medical Trust, Bangalore, India. All the participants had a minimum of 12years of formal education. All of them had Kannada (Kannada is a South Indian Dravidian Language spoken in the state of Karnataka, India) as their first language (L1) and English as their second language (L2) with vision and hearing acuity corrected to normal / near normal limits. All the clinical participants were diagnosed by neurologists/ psychiatrists/ neurosurgeon or geriatric specialist. Second language proficiency was assessed using Second Language Proficiency Rating Scales (ISLPR) by [20] in both Kannada and English to categorize and those who scored "three" and above were selected for the study (persons with vocational proficiency in second language).

Healthy elderly participants were not suffering from any neurological (such as stroke, dysarthria, etc) or psychological illness (such as, mental retardation, memory impairment, schizophrenia etc) likely to impair performance and were not complaining of memory or other cognitive difficulties. A score of 25 and above in MMSE and a score of "zero" in clinical dementia rating was required for healthy elderly group. Table 1 shows the mean age, years of education, and handedness of all the participants, and duration of illness for persons with dementia. There were no significant differences in the distribution of males and females ($p>0.05$). Also the participants in the dementia group exhibited

similar cognitive decline despite having different types of dementia.

Table 1. Age, years of education, and handedness of all the participants, and duration of illness for persons with dementia

	HE, N= 10		PWD, N= 10	
	M	SD	M	SD
Age	72.6yrs	6.39792	70.8yrs	6.97296
Years of education	12.8yrs	1.68655	11.9	2.46982
Duration of illness (in months)	--		7.7months	1.82878
Handedness	right		right	

HE = Healthy elderly, PWD = persons with dementia, M = mean, SD = standard deviation, N = number of participants

MATERIAL

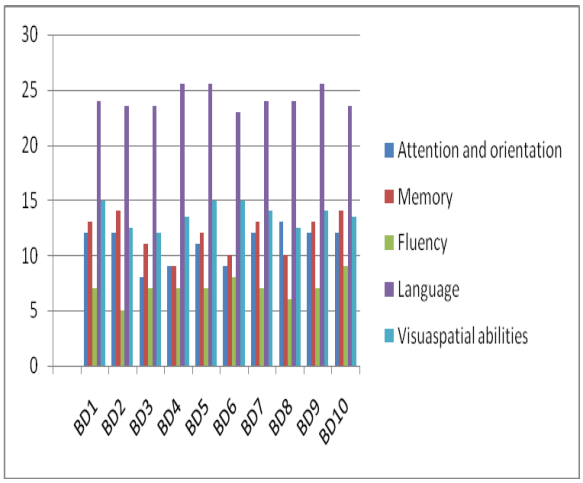
Included for the study are two test protocols for assessing cognitive linguistic skills in elderly population. These tests include Addenbrooke's Cognitive Examination Revised [21] and Clinical Dementia Rating scale.[22] And for assessing the effectiveness in linguistic levels and bilingual competence (Kannada and English) in Part C (Bilingual portion) of Bilingual Aphasia Test (BAT[23]) was used. International English Proficiency rating Scale by [20] was used to assess language proficiency.

Procedure

There were two groups considered for the study. A non-invasive method was used for the study. All the participants were interviewed and the general history was gathered. General history including the demographic details of the participants, education history, language history, medical history and present health status and any other associated problems were documented. Participants were expected to answer as much as they could. For the patient population frequent breaks were provided as they were unable to co-operate for longer duration. Followed by the general history, a written consent was obtained from all the participants regarding the willingness for the participation in the study. Language proficiency was measured using International Second Language Proficiency Rating Scales by.[20] The clinical groups and healthy elderly groups were studied for ACE-R and part C of BAT. The domains of ACE-R are attention/orientation (18 points), memory (26 points), fluency (14 points), language (26 points) and visuospatial abilities (16 points). The maximum score for is 100, composed by the addition of all domains. The domains of BAT considered for the study were word recognition (WR), word translation (WT), sentence translation (ST), grammaticality judgment (GJ), and grammaticality judgment correction GJC). These tasks were both in Kannada and English. That is each task was done twice. Initially it was from Kannada to English and then from English to Kannada. Three types of comparisons were performed. Firstly, the group with HE was compared with PWD for all the parameters in part C of the BAT. Secondly, HE were compared between the parameters for the performance in Kannada versus English for the parameters of BAT. And finally the PWD were compared between the parameters for the performance in Kannada versus English for the parameters of BAT.

RESULTS

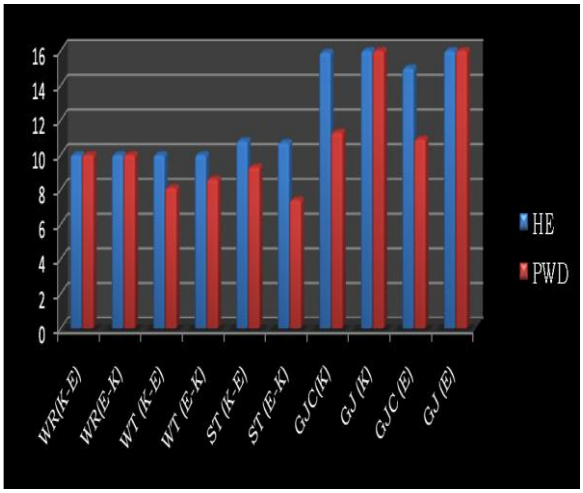
Addenbrooke's cognitive examination revised was administered to all the persons with dementia. The result of ACE-R for persons with dementia is depicted in graph 1. Since there was similar cognitive decline for persons with dementia, they were grouped together. Though the diagnosis of type of dementia was different for participants all were in the mild stage of the disease.



Graph 1: Mean scores of ACE-R for bilingual persons with Dementia

Healthy elderly and persons with dementia were compared for performance in linguistic measures using bilingual portion of Bilingual Aphasia Test (part C). Graph 2 depicts the mean scores obtained by the participants for Bilingual Aphasia Test (part C).

Independent sample t test was administered between the groups to compare linguistic measures. The results are depicted in Table 2. The test was administered to check for the main effect of group for tasks in BAT. As it is seen from the table 2, there was significant group difference for tasks such as word translation, sentence translation, and grammaticality judgment correction. But the tasks word recognition and grammaticality judgment did not show significant difference between the groups at $p < 0.000$ level and at 95% confidence interval of difference.



Graph 2: Mean scores of the participants for Bilingual Aphasia Test (PART C)
WR = Word Recognition, WT = Word Translation, ST = Sentence Translation, GJ = Grammaticality Judgment, GJC = Grammaticality Judgment Correction, K-E = Kannada to English, E-K = English to Kannada

Table 2: Results of independent sample t test between HE and PWD

Parameters	Groups	N	Mean	Standard Deviation	Sig (2 tailed)
WR(K-E)	HE	10	10.0000	.0000	a
	PWD	10	10.0000	.0000	
WR(E-K)	HE	10	10.0000	.0000	a
	PWD	10	10.0000	.0000	
WT (K-E)	HE	10	10.0000	.0000	0.000***
	PWD	10	8.1000	1.1972	
WT (E-K)	HE	10	10.0000	.0000	.001**
	PWD	10	8.6000	.8433	
ST (K-E)	HE	10	10.8000	1.3166	0.12*
	PWD	10	9.3000	1.0593	
ST (E-K)	HE	10	10.7000	1.0593	0.12*
	PWD	10	7.4000	.9661	
GJ C(K)	HE	10	15.9000	.3162	0.000***
	PWD	10	11.3000	1.4944	
GJ (K-E)	HE	10	16.0000	.0000	a
	PWD	10	16.0000	.0000	
GJC (E)	HE	10	15.0000	.8165	0.000***
	PWD	10	10.9000	.9944	
GJ (E-K)	HE	10	16.0000	.0000	a
	PWD	10	16.0000	.0000	

WR = Word Recognition, WT = Word Translation, ST = Sentence Translation, GJ = Grammaticality Judgment, GJC = Grammaticality Judgment Correction, K-E = Kannada to English, E-K = English to Kannada, N = number of participants, K = Kannada, E = English, * = significant, ** = highly significant, *** = very highly significant, a = the correlation and t cannot be computed because the standard error of the difference is 0.

Paired sample t test was administered for HE to check the effect of language on all the tasks in BAT. The effect of language condition here means the competency of participants to perform tasks between two languages (Kannada and English). All the tasks in BAT are from Kannada to English and English to Kannada condition. The tasks included WR (Word Recognition), WT (Word Translation), ST (Sentence Translation), GJ (Grammaticality Judgment), and GJC (Grammaticality Judgment Correction). Table 3 depicts the result of paired sample t test for HE. As it is seen from the table 3, there was significant difference for language condition for the task involving grammaticality judgment correction. Other tasks such as word recognition, sentence translation, grammaticality judgment did not show

significant difference for language condition at p <0.001 level. That is the HE participants were also finding difficulty similar to that of PWD. They could not correct the grammatically incorrect sentences in English. The HE were not accurate in translating the Kannada sentences to English as well as English sentences to Kannada but the scores were not significantly different at p <0.001 level.

Table 3: Results of paired sample t test for HE

Parameters	Mean	Standard Deviation	Sig (2 tailed)
WR(K-E)	10.0000	.0000	a
WR(E-K)	10.0000	.0000	
WT (K-E)	10.0000	.0000	a
WT (E-K)	10.0000	.0000	
ST (K-E)	10.8000	1.3166	.859 ns
ST (E-K)	10.7000	1.0593	
GJ C(K)	15.9000	.3162	.004**
GJC (E)	15.0000	.8165	
GJ (K-E)	16.0000	.0000	a
GJ (E-K)	16.0000	.0000	

WR = Word Recognition, WT = Word Translation, ST = Sentence Translation, GJ = Grammaticality Judgment, GJC = Grammaticality Judgment Correction, K-E = Kannada to English, E-K = English to Kannada, K = Kannada, E = English, ns = not significant, ** = highly significant, a = the correlation and t cannot be computed because the standard error of the difference is 0

Table 4: Result of paired sample t test for PWD

Parameters	Mean	Standard Deviation	Sig (2 tailed)
WR(K-E)	10.0000	.0000	a
WR(E-K)	10.0000	.0000	
WT (K-E)	8.1000	1.1972	.244 ns
WT (E-K)	8.6000	.8433	
ST (K-E)	9.3000	1.0593	.002**
ST (E-K)	7.4000	.9661	
GJ C(K)	11.3000	1.4944	.168 ns
GJC (E)	10.9000	.9944	
GJ (K-E)	16.0000	.0000	a
GJ (E-K)	16.0000	.0000	

WR = Word Recognition, WT = Word Translation, ST = Sentence Translation, GJ = Grammaticality Judgment, GJC = Grammaticality Judgment Correction, K-E = Kannada to English, E-K = English to Kannada, K = Kannada, E = English, ns = not significant, ** = highly significant a = the correlation and t cannot be computed because the standard error of the difference is 0.

Paired sample t test was again administered for PWD to check the effect of language on all the tasks in BAT. The tasks include WR (Word Recognition), WT (Word Translation), ST (Sentence Translation), GJ (Grammaticality Judgment), and GJC (Grammaticality Judgment Correction). Table 4 depicts the result of paired sample t test for PWD. As it is seen from the table 4, there was significant difference for language condition for the task involving sentence translation. Other tasks such as word recognition, grammaticality judgment correction, and grammaticality judgment did not show significant difference for language condition at p <0.001 level.

PWD were not able to translate words in Kannada to English as accurately as they could do with English words to Kannada. Although they exhibited difficulty in correcting the grammatically incorrect sentences in English to Kannada as well as sentences in Kannada to English. But the difference was not significantly different at p < 0.001 level.

DISCUSSION

On comparing the HE with PWD, tasks involving word translation, sentence translation and grammaticality judgement correction showed highly significant difference between the groups. Persons with dementia were inaccurate in performing these tasks as compared to healthy elderly. Our findings support the concept that dementia affects the ability of individuals to perform proficiently in linguistics tasks for languages they is known. The effect is more pronounced for second and third languages of the individuals. As an effect of dementia persons start losing their ability to code switch and code mix. Hence they failed to come out with the right response. Or they may even end up with failure to attempt a particular task. This finding is supported by, [24] who stated that "*subjects with dementia did not make use of code switching strategies, and there was some relationship between age of acquisition, pattern of use and verbal fluency scores*".

The group with HE was compared for the different tasks in BAT in two language conditions (Kannada to English and English to Kannada). The main effect of language condition was significantly high for the task involving grammaticality judgement correction. That is the HE found difficulty in correcting the grammatically incorrect sentences in English. The difficulty in task may be attributed to the fact that English being the second language, the proficiency may be deteriorating with advanced age.

The general language deterioration can be related to age. The HE also had difficulty in sentence translation from English to Kannada, but there was no significant difference for language condition. The findings support [9] who states that with advancement of age the accuracy of maintaining language proficiency in more than one language deteriorates. The deterioration affects both languages, and support a non-modular explanation of language decline in the elderly. The results provide evidence in support of the hypothesis that all linguistic levels (phonology, morphology, syntax, lexicon and semantics) deteriorate in the elderly even though only some linguistic skills (comprehension, repetition, lexical access and propositioning) are impaired. The deterioration in attention could affect the most complex levels of linguistic abilities in old people. This is agreement with two authors. [25]

Similar analysis was done for the group with PWD. PWD were not able to translate words in Kannada to English as accurately as they could do with English words to Kannada. They faced difficulty in correcting the grammatically incorrect sentences in English to Kannada as well as sentences in Kannada to English. But the difference was not significantly different at $p < 0.001$ level. This suggests that PWD not only had difficulty with their second language but also the primary language was deteriorating with the disease. Bilingualism affects the cognitive and linguistics performance across the disease condition. Bilinguals typically have lower formal language proficiency than monolinguals. There are studies [12,14] which suggest that bilingualism acts as protective shield against developing dementia. But to claim it as a point, the proficiency in two languages is important. More the mastery in both the languages, the more the protection against developing dementia. In the present scenario PWD wanted several repetitions for the stimuli. It was true for both words as well as sentence level. And they required multiple attempts before giving the correct response or the final response initiating self-repair abilities. Although the final attempt generally was an incorrect response. Hence the language mediates not only the social relationship systems, but also the control of cognitive processes.

CONCLUSION

To conclude, in bilingual persons with dementia, regression to a primary language may be associated with development of cognitive impairment. Although the ability of using two languages was similar in both the population, they all relied on L1. Participants with dementia failed to differentiate that they were using two distinct languages at several conditions strongly indicating the retreating of bilingual competence into monolingualism. This may be explained due to reduced neural networks and synapses as a consequence of atypical aging.

REFERENCES

1. Smith AD, Fullerton AM. Age differences in episodic and semantic memory: Implications for language and cognition. In: Beasley, D.S., &Davis, G.A.: Aging Communication Processes and Disorders. New York: Grune& Stratton;1981
2. Bayles KA., Kaszniak AW, Tomoeda CK. Communication and Cognition in Normal Aging and Dementia. Boston, MA, USA: College-Hill Press; 1987.
3. Bayles KA. Alzheimer's disease symptoms: Prevalence and order of appearance. J Applied Gerontology, 1991; 10: 419-430.
4. Perry R, Watson P, Hodges J. The nature and staging of attention dysfunction in early (minimal and mild) Alzheimer's disease: Relationship to episodic and semantic memory impairment. Neuropsych. 2000; 38, 252-271.
5. Backman L, Small BJ, Fratiglioni L. Stability of the preclinical episodic memory deficit in Alzheimer's disease: Brain: J Neurology 2001 Jan; 124(1): 96-102.
6. EmeryOB, Emery PE. Language in senile *dementia* of the Alzhei- mer'stype. Psychiatric J University of Ottawa, *1983;* 8: 169-178.

7. Murdoch BE, Chenery HJ, Wilks V, Boyle RS. Language disorders in dementia of the Alzheimer type. Brain and Lang. 1987*;* 31(1):122-37.
8. Hyltenstam K, Obler LK. Bilinguals across the lifespan: Aspects of Acquisition, Maturity and Loss. New York: Cambridge University Press; 1989.
9. Rabadán OJ. The assessment of bilingualism in normal aging with the bilingual aphasia test. J Neurolinguis.1994; 8(1): 67-73.
10. Baker R. Language testing and the assessment of dementia in second language settings: a case study. Language Testing, 1996; 13(1): 3-22.
11. McMurtray A, Saito E, Nakamoto B. Language preference and development of dementia among bilingual individuals. Hawaii Medi J.2009;68(9):223-6.
12. Bialystok E, Craik FIM, Freedman M. Bilingualism as a protection against the onset of dementia. Neuropsycho.2007; 45, 459-464.
13. Craik FI. Delayign the onset of Alzheimer's disease. *Neurology*. 2010; 75(19): 1726-29.
14. Chertkow H. Speaking two languages may protect the brain. Alzheimer's Disease Association. 2010; 24 (2): 118-25.
15. Meguro K, Senaha ML. Caramelli P, Ishizaki J, ChubacciRY, Meguro M, Ambo H, Nitrini R, Yamadori A. Language Deterioration in Four Japanese–Portuguese Bilingual Patients with Alzheimer's Disease: A Trans-Cultural Study Of Japanese Elderly Immigrants In Brazil. Psychogeri. 2003; 3(2), 63–68.
16. Bialystok E,Craik FIM. Cognitive and Linguistic Processing in the Bilingual Mind.Current Directions in Psychological Science.2010; 19 (1),19-23.
17. Ardilla A, Ramos A. Bilingualism and Aging. Perspectives on Communication Disorders and Sciences in Culturally and Linguistically Diverse Populations. 2010; 17: 74-81.
18. Sergio Zanini S, Tavano A, Fabbro F. Spontaneous language production in bilingual Parkinson's disease patients: Evidence of greater phonological, morphological and syntactic impairments in native language. Brain and Lang. 2010;113(2), 84-89.
19. Folstein MF, Folstein SE, McHugh PR. "Mini- mental state": A practical method for grading the mental state of patients for the clinician. J Psychiatric Research. 1975; 12: 189-198.
20. Wylie E, Ingram DE. International Second Language Proficiency Ratings (ISLPR) general proficiency version for English Nathan, Qld.: Centre for Applied Linguistics and Language, Mt Gravatt Campus Griffith University; 2006.
21. Krishnan, G., Lokesh, M. Addenbrooke's Cognitive Examination Revised in Kannada. Manuscript submitted to Annals of Neurology. 2010.
22. Hughes CP, Berg L, DanzigerWL, CobenLA, Martin, RL. A new clinical scale for the staging of dementia. British J Psych. 1982;140, 566-572.
23. Paradis M. Rangaman, GN. Bilingual Aphasia Test (English-Kannada version) Hillsdale, NJ: Lawrence Erlbaum. 1989
24. Picciotto JD, Deborah Friedland D. Verbal Fluency in Elderly Bilingual Speakers: Normative Data and Preliminary Application to Alzheimer's Disease. Folia Phon EtLogop.2001;53:145-152.
25. Rabadán, OJ, Iglesias FJ. Decline in the elderly's language: Evidence from cross-linguistic data. J Neur ling. 1994; 8(3): 183-190.

How to cite this article: Deepa M.S., Chengappa. S.K. Language preferences and attrition in bilingual persons with dementia. Int J Health Sci Res. 2019; 9(6):293-300.

******