

Cognitive Linguistic Aspects in Healthy Individual and Individual with Cognitive Deficits Using Tamil CLAP

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ABSTRACT

The present study aimed to compare the Tamil-Cognitive Linguistic Assessment Protocol (T-CLAP) scores among Healthy Individuals (HI) and Cognitive Deficit Individuals (CDI) across various ages and also to examine effect of age, severity and age*severity effect using developed T-CLAP by Vijay and Lydia, 2018. 80 HI and 25 CDI (9 Mild CDI and 16 severe CDI) were taken as participants in the age range of 24-75+ years and were classified according to 'Development through life Classification'. The data obtained were subjected to both Descriptive and Inferential statistical analysis which was carried out using SPSS software (version 25) to find significant difference in all four domains across various age groups, severity and age*severity effect in both HI and CDI. Descriptive statistics result revealed that across the four domains, Domain IV (Organization) was observed to be more sensitive to detect cognitive decline, hence CDI scored very less mean scores than HI. Overall result reveals that T-CLAP could differentiate between HI and CDI and also helps to distinguish the severity level. Significant difference was observed for age, severity and age* severity. Hence T-CLAP can serve as a valid tool to differentiate the HI and CDI.

Keywords: T-CLAP, Domain, Aging, Severity, Cognitive deficit.

INTRODUCTION

Cognitive linguistics, an interdisciplinary branch of linguistics, was

first coined by George Lakoff. [1] It describes how language interact with cognition, and helps to forms thought. [2] The main goal of cognitive linguistic research is to properly determine the mental representations which are constructed by various linguistic utterances.

Aging refers to a multidimensional process in humans, which includes the process of physical, psychological and social changes. The various cognitive changes accompany with aging impinge on linguistic abilities which can lead to problems such as difficulty in word retrieval processes, decline in complex discourse processes and difficulty in higher level comprehension tasks such as drawing inferences, recalling story gist, and detecting verbal anomalies [3]

It became increasingly important to understand cognitive changes that accompany ageing both in normal and pathologic. Normal aging occurs due to natural maturational processes whereas 'Pathological' aging can be due to disease or trauma to the brain which is the non-normative factors. The principal factor for pathological aging includes nutrition, physical activity, hormones, inflammation, depression, ecology and social/ behavioral factors. [4] It affects global cognitive function impairing memory, language, thinking, reasoning and interferes substantially with daily living capacity.

Thus to distinguish between normal and pathological aging, a cognitive linguistic tool is essential for identifying cognitive deficits in person with cognitive communication disorders and this would also help in planning intervention programs for person with cognitive communication disorders. Cognitive linguistic assessment protocol in Tamil (T-CLAP) was developed by Vijay and Selvaraj in 2018 which serve as a promising tool to assess the cognitive linguistic abilities in adults and elderly population. Hence the present study, aimed to compare the T-CLAP scores among healthy and cognitive deficit individuals across the ages and the objective of the present study is to examine effect of age, gender and severity effect across the ages

for both healthy and cognitive deficit individuals using T-CLAP.

MATERIALS AND METHOD

T-CLAP was administered on 80 HI (Healthy individuals) and 25 CDI (Cognitive deficit individuals -9 Mild CDI and 16 severe CDI). The participants were classified according to ‘Development through life Classification.’ [5] Table 3.1 depicts the information on distribution of participants into various groups based on the age range distribution. The participants were selected adhering to the appropriate ethical procedures. Participants were selected from the residential areas and old age homes in the city of Chennai, Tamilnadu.

Table 3.1 Age Range Distributed for HI and CDI

Group	Age Range	Newmann’s Classification	Healthy Individual	Cognitive Deficit Individual
1	24-34 years	Early Adulthood	10 Males and 10 females	5 Males and 2 females
2	34-60 years	Middle Adulthood	10 Males and 10 females	6 Males
3	60-75 years	Later Adulthood	10 Males and 10 females	2 Males and 4 females
4	75+ years	Very old age	10 Males and 10 females	1 Male and 6 females

Table 3.2 Task under each domain and their scorings

Domain	Test Item	Maximum score
I. Attention, Perception and Discrimination		
Visual	Letter Cancellation	10
	Contingent Letter Cancellation	10
	Word Cancellation	10
	Sound count	10
Auditory	Letter-Pair discrimination	5
	Word -Pair discrimination	5
	Months-backwards naming	10
II. Memory		
Episodic Memory	Orientation and recent memory questions	10
Working Memory	Digit Forward	5
	Digit backward	5
Semantic Memory	Co-ordinate naming	5
	Super ordinate naming	5
	Word-naming fluency	5
	Generative naming	5
	Sentence repetition	10
	Carry out commands	10
III. Reasoning & Problem Solving		
	Sentence disambiguation	10
	Sentence formulation	5
	Predicting outcome	10
	Compare and contrast	10
	Predicting cause	10
	Why Questions	5
	Sequential Analysis	10
IV. Organization		
	Categorization	10
	Analogies	10
	Sequencing events	40

Source: Cognitive-linguistic Assessment Protocol for adults (Kamath, 2001)

T-CLAP consist of four domains namely Attention, perception and discrimination, memory, reasoning and problem solving and organization. The tasks and the scorings for each domain are depicted in table 3.2

Inclusion and Exclusion Criteria

The participants selected were native speakers of Tamil with minimum of primary schooling, no obvious or known history of neurological and/or psychological disorders, scoring greater than or equal to 25 points on the Mini Mental State Examination-MMSE. [6] Participants with h/o drug/alcohol abuse, hearing/ visual /communication problems and physically unfit during the test period were excluded from the study.

Procedure

The aim of the study, procedure and duration of testing were explained to the participants. Prior written consent was taken from the participants for the participation in the study. All the participants were tested in a quiet, noise free environment at home or clinical setting. The stimuli were presented in auditory/visual mode according to the

need of test items in all 4 domains. Scores were tabulated for each test item in all domains.

Statistical methods

The raw score obtained from each individual was subjected to descriptive and inferential statistical analysis which includes Mean and Standard Deviation (SD), One Way ANOVA, MANOVA and Independent T test to find out the significant differences across the age groups and genders if any using Statistical Package for the Social Science (SPSS) version 25.00.

RESULT

The aim of the present study is to compare Cognitive Linguistic Assessment Protocol in Tamil (T-CLAP) in healthy individuals and individuals with cognitive deficits. The

objective is to observe the age and gender effect among the individuals. The findings of the study has been presented in the following order

1. Overall Mean and SD for each domain and test
2. Domain wise comparison to check for effect of age among cognitive deficit individuals (CDI) and healthy individuals (HI)

Overall Mean and SD for each domain and test

Mean and standard deviation (SD) values were obtained for healthy individuals (80 participants) and cognitive deficit individuals (25 participants) for all four domains and task which are tabulated and shown in table 4.1

Table 4.1 Overall Mean and SD for each domain and test

Domain	Cognitive deficits individuals (N=25)		Healthy Individuals (N=80)	
	Mean	SD	Mean	SD
Domain I: Attention				
Visual :LC	4.28	3.27	9.32	0.97
CLC	3.56	3.12	9.31	1.05
WLC	3.84	3.09	9.66	0.77
Auditory: SC	2.48	2.20	8.79	1.32
LPD	2.24	1.26	4.49	0.96
WPD	2.16	1.10	4.63	0.62
MBC	0.32	0.62	8.75	2.23
Domain II				
Episodic: ORCQ	5.24	1.53	9.14	1.11
Working: DF	1.72	0.98	3.61	1.27
DB	0.52	0.71	2.61	1.20
emantics: CN	1.92	0.81	4.35	0.98
SN	1.40	1.25	4.64	0.68
WNF	0.28	0.54	4.60	0.94
GN	3.12	1.50	4.93	0.34
SR	5.12	2.55	10.00	0.00
COC	5.12	2.90	9.98	0.22
Domain III;SD	1.44	1.96	7.68	2.11
SF	0.12	0.33	3.91	1.38
PO	5.24	2.86	9.74	0.86
CAC	1.24	1.69	9.05	1.59
PC	4.28	2.28	9.59	0.97
WQ	2.80	1.60	4.93	0.26
SA	3.84	1.95	9.52	1.09
Domain IV				
C	0.76	1.23	8.90	1.51
A	0.00	0.00	8.61	1.68
SE	0.72	1.51	29.30	11.05

The findings of the present study revealed that the domain IV (Organization) have been observed to be most difficult, requiring higher cognitive load hence CDI scored very less mean scores when

compared with healthy individuals (HI) which emphasize that domain IV can predict the cognitive linguistic changes across ages much better than memory, reasoning and

problem solving, attention, perception, and discrimination domains.

However domain I (Attention, perception and discrimination) observed to be easiest and require least cognitive load hence CDI didn't find greater difficulty in doing the task especially visual test. In auditory test, month backward naming was observed to be difficult task for CDI when compared to HI.

In domain II (Memory), episodic memory task was not greater difficult for CDI however in working memory especially in digit backward task the individuals secured least scores which reveals that working memory found to be most sensitive for detecting cognitive decline. In semantic memory, word naming fluency task has obtained least scores followed by superordinate naming task by CDI. Sentence

repetition and carry out command task was observed to be least sensitive for cognitive decline hence CDI didn't find greater difficulty in these tasks.

Domain III (Reasoning and problem solving), least mean scores was obtained in sentence formulation followed by compare and contrast task by CDI. However predicting cause and predicting outcome task was found to be least sensitive for cognitive decline.

Domain wise comparison to check for effect of age among cognitive deficit individuals (CDI) and healthy individuals (HI)

Domain I

Mean and SD values are calculated for all four age groups among CDI and HI with F and p values which are tabulated in table 4.2 to show the effect of aging.

Table 4.2 Mean and SD for domain I (Both visual and auditory mode).

Domain	Task	Group 1 (24-34 years)			Group 2 (34-60 years)			Group 3 (60-75 years)			Group 4 (75 years and above)			F value	P value
		M	S	N	M	S	N	M	S	N	M	S	N		
Domain I Visual	LC	6.50 (1.8)	1.00 (1.4)	9.75 (0.4)	2.00 (2.8)	2.33 (4.0)	9.40 (0.8)	3.00 (0.0)	2.75 (4.2)	9.20 (0.8)	-	5.86 (2.6)	8.95 (8.9)	78.1	0.00
	C	5.17 (1.1)	.00 (0.0)	9.75 (0.5)	1.50 (2.1)	.67 (1.1)	9.75 (0.4)	2.00 (0.0)	2.50 (3.7)	8.95 (1.0)	-	5.86 (3.1)	8.80 (1.4)	101.3	0.00
	WC	6.33 (1.0)	.00 (0.0)	9.95 (0.2)	2.00 (2.8)	.67 (1.1)	9.80 (0.5)	3.00 (0.0)	2.50 (3.1)	9.65 (0.6)	-	5.57 (2.8)	9.25 (1.2)	131.2	0.00
Auditory	SC	5.00 (1.7)	.50 (0.7)	9.50 (0.8)	2.00 (1.41)	3.33 (2.3)	9.00 (1.2)	2.00 (0.0)	.75 (0.9)	8.05 (1.5)	-	1.71 (1.9)	8.60 (1.2)	180.6	0.00
	LPD	3.17 (1.3)	0.00 (0.0)	4.90 (1.0)	2.50 (2.1)	2.33 (0.5)	4.85 (0.4)	3.00 (0.0)	1.50 (1.2)	4.05 (1.1)	-	2.29 (0.4)	4.15 (0.6)	50.9	0.00
	WPD	3.00 (0.8)	0.00 (0.0)	4.65 (0.4)	2.50 (2.2)	2.00 (0.0)	4.90 (0.3)	3.00 (0.0)	1.75 (0.9)	4.60 (0.6)	-	2.14 (0.6)	4.35 (0.8)	119.37	0.00
	MBC	0.83 (0.9)	0.00 (0.0)	9.15 (1.6)	1.00 (0.0)	0.00 (0.0)	9.50 (0.6)	.00 (0.0)	.00 (0.0)	9.20 (1.9)	-	0.14 (0.3)	7.15 (3.1)	172.3	0.00

Visual mode:

In domain I, visual modality has three task namely letter cancellation, contingent letter cancellation and word cancellation. Overall in all these task HI obtained good mean scores when compared to mild and severe CDI. In age group 24-34 years HI secured highest mean scores of 9.95 in word cancellation task whereas mild and severe CDI obtained highest scores in letter cancellation (6.50 and 1.00) and least in contingent letter cancellation task (5.17 and 0.00). In age group 34-60 years very least mean scores of 0.00 and 0.06 was secured by severe CDI especially in contingent letter cancellation and word

cancellation task. However HI scored highest in word cancellation and least in letter cancellation task. In age group 60-75 years mild CDI secured least scores in contingent letter cancellation (2.00) and equal scores of 3.00 in both letter and word cancellation task, whereas severe CDI have obtained equal scores of 2.50 in contingent letter cancellation and word cancellation task. Above 75 years age group severe CDI have scored less scores in word cancellation task (5.57) and equal scores of 5.86 in letter and contingent letter cancellation task. Significant test reveals that in visual mode, all three task observed to have significant difference between and within groups.

Auditory mode

Auditory mode has four tasks namely sound count, letter pair discrimination, word pair discrimination and month backward naming. Overall on comparing mean scores among HI and CDI, good mean scores was secured by HI followed by mild and severe CDI. On comparing the performance between the age groups, 24-34 years age group highest mean scores was observed in sound count task, whereas least mean scores was secured in month backward naming task by HI and by both mild and severe CDI. Severe CDI found difficult to perform all tasks except sound count. In age group 34-60 years, HI obtained highest scores in month backward counting followed by word pair discrimination however in mild CDI highest scores of 2.50 was observed for letter and word pair discrimination and least scores of 1.00 in month backward naming. Whereas in severe CDI, highest scores of 3.00 secured in sound count and least scores of 0.00 in month backward naming. In age group 60-70 years, highest mean scores of 9.20 was observed in month backward naming task by HI whereas in mild and

severe CDI, letter pair discrimination and word pair discrimination secured highest mean scores of 3.00 and 1.75 respectively. Thus both mild and severe CDI have difficult in month backward counting task. In age group 75+ years, HI secured highest mean scores in sound count and word pair discrimination whereas severe CDI obtained highest mean scores of 2.29 in letter pair discrimination and least scores of 0.14 in month backward naming. Overall between and within the age groups significant difference was obtained in all tasks under auditory mode.

Thus to summarize, in visual mode contingent letter cancellation found to be difficult and most sensitive to detect cognitive decline across the ages where as in auditory mode, month backward counting found to be most sensitive. Also mild CDI performed better when compared with severe CDI.

Domain II

Mean and SD values are calculated for all four age groups among CDI and HI with F and p values which are tabulated in table 4.3 to show the effect of aging.

Table 4.3 Mean and SD for domain II

Domain	Task	Group 1 (24-34 years)			Group 2 (34-60 years)			Group 3 (60-75 years)			Group 4 (75 years and above)			F value	P value
		M	S	N	M	S	N	M	S	N	M	S	N		
DOMIN II	EPISODIC QRMQ	6.17 (1.1)	2.50 (0.7)	9.35 (1.3)	4.50 (2.3)	5.33 (0.7)	9.55 (0.6)	5.50 (1.91)	4.00 (0.0)	8.95 (0.9)	-	5.43 (0.7)	8.70 (1.1)	97.13	0.00
WORKING	DF	2.33 (0.8)	1.00 (1.4)	4.35 (1.4)	1.50 (0.7)	1.00 (1.0)	4.05 (0.9)	2.00 (0.0)	1.25 (1.2)	3.35 (1.1)	-	2.00 (0.8)	2.70 (0.8)	23.94	0.00
	DB	1.00 (0.8)	0.00 (0.0)	3.30 (1.3)	0.50 (0.7)	0.00 (0.0)	3.15 (1.1)	0.00 (0.0)	0.50 (0.5)	2.25 (0.6)	-	0.57 (0.7)	1.75 (0.9)	34.05	0.00
SEMANTICS	CN	2.67 (0.8)	1.50 (0.7)	4.80 (0.5)	2.50 (0.7)	2.00 (1.0)	4.90 (0.4)	2.00 (0.0)	1.50 (0.5)	4.20 (1.0)	-	1.43 (0.5)	3.50 (1.0)	69.77	0.00
	SN	2.00 (1.2)	.00 (0.0)	4.90 (0.3)	1.50 (0.7)	1.33 (2.3)	4.95 (0.2)	1.00 (0.0)	1.00 (0.8)	4.45 (0.7)	-	1.57 (1.2)	4.25 (0.9)	141.8	0.00
	WNF	0.83 (0.7)	0.00 (0.0)	4.80 (0.5)	0.00 (0.0)	0.33 (0.5)	5.00 (0.0)	0.00 (0.0)	0.25 (0.5)	4.50 (1.1)	-	0.00 (0.0)	4.10 (1.2)	235.6	0.00
	GN	4.17 (0.4)	.50 (0.7)	5.00 (0.0)	3.50 (0.7)	3.33 (1.1)	4.95 (0.2)	4.00 (0.0)	2.00 (2.3)	5.00 (0.0)	-	3.29 (1.1)	4.75 (0.6)	69.80	0.00
	SR	6.50 (1.9)	3.00 (2.8)	10.00 (0.0)	3.00 (0.0)	5.33 (4.0)	10.00 (0.0)	3.00 (0.0)	4.75 (2.8)	10.00 (0.0)	-	5.57 (2.4)	10.00 (0.0)	148.5	0.00
	COC	8.33 (1.9)	3.00 (0.0)	10.00 (0.0)	4.00 (1.4)	4.33 (2.3)	10.00 (0.0)	5.00 (0.0)	3.25 (2.7)	10.00 (0.0)	-	4.71 (3.0)	9.90 (0.4)	162.1	0.00

Episodic memory

Episodic memory involves one task namely orientation and recent memory questions. On comparing the overall performance across all the age groups HI has secured

highest mean scores than mild and severe CDI. However on comparing the performance between mild and severe CDI, severe group has obtained least mean scores in all age groups. Also significant difference

was observed between and within all age groups.

Working memory

Working memory involves two task namely digit forward and digit backward. In both task, across all the age groups, HI secured good mean scores than mild CDI than severe CDI. HI obtained highest mean scores in group I and least in age group IV whereas mild CDI secured highest in group I and least in group II and severe CDI secured highest in group IV and least in group II and III respectively. Also significant difference was observed between and within age groups in both tasks under working memory.

Semantic memory

Semantic memory involves six tasks. On comparing performance between HI and CDI, HI secured greater mean scores in group II and least in group IV for co-ordinate naming, superordinate naming and word naming fluency whereas in generative

naming task higher scores was seen in group I and III, and least in group IV. However in other tasks similar mean scores was secured by all age groups which highlight the facts that sentence repetition and carryout command is least sensitive for cognitive decline across ages. On comparing between pathological group both mild and severe CDI secured least scores in co-ordinate naming, superordinate naming, word naming fluency and generative naming. However in sentence repetition and carryout command task, least scores were secured by severe CDI than mild CDI. Overall significant differences were obtained both within and between groups in tasks under semantic memory.

Domain III

Mean and SD values are calculated for all four age groups among CDI and HI with F and p values which are tabulated in table 4.4 to show the effect of aging.

Table 4.4 Mean and SD for domain III

Domain	Task	Group 1 (24-34 years)			Group 2 (34-60 years)			Group 3 (60-75 years)			Group 4 (75 years and above)			F value	P value
		M	S	N	M	S	N	M	S	N	M	S	N		
DOMAIN III	SD	1.17 (1.4)	0.00 (0.0)	9.20 (1.0)	0.00 (0.0)	0.00 (0.0)	8.35 (1.7)	0.00 (0.0)	1.25 (2.5)	7.20 (2.1)	-	3.43 (1.7)	5.95 (1.7)	86.63	0.00
	SF	0.17 (0.4)	0.00 (0.0)	4.50 (0.6)	0.00 (0.0)	0.00 (0.0)	4.55 (1.4)	0.00 (0.0)	0.00 (0.0)	3.70 (1.3)	-	0.29 (0.4)	2.90 (1.3)	91.30	0.00
	PO	6.67 (2.7)	2.00 (2.8)	10.00 (0.0)	5.50 (0.7)	2.67 (3.0)	9.90 (0.4)	6.00 (0.0)	3.75 (1.2)	9.15 (1.4)	-	6.71 (2.8)	9.90 (0.4)	85.71	0.00
	CAC	3.33 (1.6)	0.00 (0.0)	9.70 (0.6)	1.00 (1.4)	1.33 (2.3)	9.75 (0.6)	2.00 (0.0)	0.00 (0.0)	8.85 (1.2)	-	.43 (0.5)	7.90 (2.40)	251.1	0.00
	PC	6.83 (2.0)	1.00 (1.4)	10.00 (0.0)	5.00 (1.4)	4.67 (3.0)	9.90 (0.3)	4.00 (0.0)	2.75 (0.9)	9.05 (1.5)	-	3.57 (0.7)	9.40 (0.9)	194.2	0.00
	WQ	3.00 (0.8)	0.50 (0.7)	5.00 (0.0)	4.00 (0.0)	4.67 (3.0)	5.00 (0.0)	4.00 (0.0)	1.50 (1.2)	4.85 (0.36)	-	2.71 (0.4)	4.85 (0.3)	72.2	0.00
	SA	5.50 (1.7)	.00 (0.0)	9.90 (0.4)	4.50 (0.7)	3.33 (1.1)	9.80 (0.6)	4.00 (0.0)	2.25 (0.5)	9.30 (1.3)	-	4.43 (1.7)	9.10 (1.4)	200.2	0.00

Domain III (Reasoning and problem solving) has seven tasks. Across the age groups HI secured good mean scores than mild CDI than severe CDI. On comparing participant's performance across the task, sentence disambiguation and sentence formulation has secured least scores than other tasks by CDI. However in predicting outcome, carry out commands, predicting cause, why question and sequential analysis task, mild CDI scored better mean scores than severe CDI, who performed poorer in these tasks. Hence these tasks are more sensitive to predict the severe CDI than mild CDI. Also significant scores were obtained for all tasks both between and within groups.

Domain IV

Mean and SD values are calculated for all four age groups among CDI and HI with F and p values which are tabulated in table 4.5 to show the effect of aging.

Table 4.5 Mean and SD for domain IV

Domain	Task	Group 1 (24-34 years)			Group 2 (34-60 years)			Group 3 (60-75 years)			Group 4 (75 years and above)			F value	P value
		M	S	N	M	S	N	M	S	N	M	S	N		
DOMAIN IV	C	1.17 (1.4)	0.00 (0.0)	9.70 (0.5)	0.00 (0.0)	0.00 (0.0)	9.50 (1.1)	0.00 (0.0)	1.00 (2.0)	8.45 (1.6)	-	1.14 (1.0)	7.95 (1.7)	295.59	0.00
	A	0.00 (0.0)	0.00 (0.0)	9.65 (0.7)	0.00 (0.0)	0.00 (0.0)	8.75 (1.6)	0.00 (0.0)	1.00 (2.0)	8.70 (1.3)	-	2.00 (2.0)	7.35 (2.0)	223.23	0.00
	SE	0.00 (0.0)	0.00 (0.0)	37.10 (2.8)	0.00 (0.0)	0.00 (0.0)	34.60 (5.7)	0.00 (0.0)	0.00 (0.0)	28.15 (10.4)	-	0.00 (0.0)	17.35 (10.6)	86.32	0.00

Note. M=Mild, S=Severe, N= Normal.

Domain IV (organization) has three tasks. On examining the participants performance across all these tasks, as age advances mean scores reduced in HI however in CDI, poor mean scores was obtained irrespective of ages in all tasks. Within and between groups, the mean scores obtained are also statistically significant.

Test of significance to assess effect of age, severity and age* severity

Two way Manova was carried out to find effect of independent variables across the age groups which reveals statistically significant difference observed for effect of age, severity and age *severity .

Effect		F	Sig.
Severity	Pillai's Trace	13.60	0.00
	Wilks' Lambda	22.90	0.00
	Hotelling's Trace	37.45	0.00
	Roy's Largest Root	70.64	0.00
Age	Pillai's Trace	2.53	0.00
	Wilks' Lambda	2.94	0.00
	Hotelling's Trace	3.30	0.00
	Roy's Largest Root	5.84	0.00
Severity * Age	Pillai's Trace	2.07	0.00
	Wilks' Lambda	2.43	0.00
	Hotelling's Trace	2.78	0.00
	Roy's Largest Root	6.57	0.00

DISCUSSION

The overall scores for each domain and test reveals that domain IV (Organization) was the most difficult for CDI and the reason for the difficulty has been quoted from a study that elderly subjects have greater difficulty in processing grammatically encoded information about relationships between events. [7]

Individuals with CDI didn't find Domain I (Attention, perception and discrimination) as a greater difficulty since older adults are skilled when compared to younger adults in assimilating information

task which was found to be present even with the distractors. Reason highlighted for these findings is that, older people tend to devote their exclusive attention to one stimulus and ignore another stimuli when compared to younger adults. [8]

Mean and SD values were calculated for all four age groups among CDI and HI and f and p value were obtained which reveals statistical significant difference across all domain in each of the age groups. Also two way Manova test shows statistical significance difference which were observed for effect of age, severity and age *severity. The limitation of the study includes limited participants with CDI and also no equal distribution of male and female participants in CDI group.

CONCLUSION

Thus to conclude the findings obtained in the present study reveals that on comparing T-CLAP performance across HI and CDI, T-CLAP could differentiate between HI and CDI and also to distinguish the severity level. Significant difference was observed for age, severity and age* severity. Hence T-CLAP serves as a valid tool to differentiate the HI and CDI.

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