

## CLOCK DRAWING PERFORMANCE AND FUNCTIONAL ABILITY AMONG THE ELDERLY

**Kammar M.R.\***

### **Abstract:**

Present paper is part of the research study entitled *Changes in aging: A cohort study*, was carried out in Dharwad district of Karnataka state covering the elderly in three age cohorts viz., 60-65, 66-70 and 70+ residing in Dharwad urban and rural area during the year January 2004 to December 2006 covering a total sample of 500 elderly men and women. For the present study, data obtained from a subsample of 125 elderly is taken for analysis. A performance test of Clock drawing was given to a subsample of 125 elderly in order to substantiate the results on cognitive ability obtained in the main sample. The test was given only to the educated elderly in order to rule out effect of education on clock drawing test.

The functional ability was assessed using the self structured interview schedule developed by the researcher. Functional Ability (FA) was further divided into five domains as physical functioning (PF), cognitive functioning (CF), psycho-motor and sensory functioning (PSF), Socio-emotional functioning (SEF) and Behavioural functioning (BF). In depth interviews were conducted by the researcher using the interview schedule. The data in present paper is obtained by the elderly regarding their perceptions of functional ability. Group discussions were also held with the family members of elderly in order to get a deep insight into data. The validity of the schedule was assessed by circulating the schedule to the experts in the field and the reliability was computed using Guttman's split half method (0.774) based on the data obtained from the pretest sample, then the schedule was modified and then was used for larger sample. The results revealed that, mean scores of clock drawing showed that, gender did not have any influence on clock drawing ability. While, there was statistically significant

\* University of Agricultural Sciences, Raichur, Karnataka.

association between place of residence and ability to draw a clock, the results favoring urban group and respondents from high income group.

The impact of age had significant effect on PF, PSF and CF. There is declining trend in these domains of FA as there is decline in age. Income had a significant impact on physical functioning (at 1 per cent level) and on socio-emotional functioning (at 5 per cent level) of probability. The positive feeling of presence of other spouse has a beneficial effect on all these domains of FA. Gender differences existed for cognitive functioning and behavioral functioning, while for the rest of other domains were not influenced by gender, revealing non-significant differences.

**Key words:** Functional ability, clock drawing test, cognitive functioning, Physical functioning, Socio-Emotional Functioning, Psycho-motor and Sensory Functioning.

### **Introduction:**

Aging is viewed from three perspectives-biological, social and psychological and these processes are symmetrically interactive with one another over the life course. Biological aging refers to the changes in the nervous system, the changes in the individuals' changing circumstances as a member of family, community and society is referred as sociological or situational aging. The situational changes refer to the completion of parental role, retirement from work, reduced income, diseases and disability and need for support. The behavioral aging is concerned with what the situational changes mean to the individual and the way he makes internal and external adjustments to them. Biologists explain that there is a strong genetic basis for ageing. In the body, the brain ages much slower than other organs which explains why some people continue to be intellectually active even after the body becomes frail (Ramamurti, 2002). This necessitates the study of gerontology not only from social/psychological/cognitive/behavioral, but from a holistic point of view to get an understanding of actual process of aging.

Analysis of demographic trend reveals that, during the year 2001, India is house of 77 million (8%) elderly. The Indian aged population is currently the second largest in the world and India is house to one out of every 10 senior citizens. According to the 2011 statistics the

population of elderly is 102 million (9%) and is projected to be 11% in 2021. In this context it is deemed to throw light on the issues concerning elderly.

Taking cognizance of these factors the following objectives were set for the present study.

- To assess the functional ability of the elderly as perceived by them through verbatim.
- To assess the cognitive ability of the elderly using clock drawing test.
- To examine pertinent demographic variables in relation to functional ability scores and Clock Drawing Test scores

### Material and methods

A research entitled *Changes in aging: A cohort study*, was carried out in Dharwad district of Karnataka state covering the elderly in three age cohorts viz., 60-65, 66-70 and 70+ residing in Dharwad urban and rural area during the year January 2004 to December 2006 covering a total sample of 500 elderly men and women. The functional ability was assessed using the self structured interview schedule developed by the researcher. The validity of the schedule was assessed by circulating the schedule to the experts in the field and the reliability was computed using Guttman's split half method (0.774) based on the data obtained from the pretest sample, then the schedule was modified and then was used for larger sample.

Functional Ability (FA) was further divided into five components as physical functioning (PF), cognitive functioning (CF), psycho-motor and sensory functioning (PSF), Socio-emotional functioning (SEF) and Behavioural functioning (BF). Cognitive functioning was assessed as a part of functional ability of the elderly. In depth interviews were conducted by the researcher using the interview schedule. Group discussions were also held with the family members of elderly in order to get a deep insight into data. Five groups of 25 elderly in each group were made and the discussions were conducted. Thus, a total of 125 elderly (25% of the total sample) were met and the information of perceived self perception of functional abilities and performance of elementary conceptual tasks were elicited by these respondents. The data collected by the respondents on each domains of functional ability through group discussions

was recorded in a verbatim and was quantified on a five point continuum. The higher the scores better the functional ability.

In a clock drawing test, setting three times in a predrawn circle as 3.00 pm, 11.10 pm and 10.50 pm was included. Each respondent was given a sheet with three pre drawn circles ( to minimize the effect of education) and the placement of hands to show the timings was requested. These clock drawings were scored by the researcher using the method described by Sunderland *et al.* (1989), which takes into account hand positioning and the score is determined by using a ten point scale (10 perfect, 0 very poor). Score of 6 or more are considered as normal (Juby, 2002) [http://www.neurosurvival.ca/Clinical Assistant/scales/clock\\_drawing\\_test.htm](http://www.neurosurvival.ca/Clinical%20Assistant/scales/clock_drawing_test.htm))

It is also derived from many research studies that, completely normal clock is a suggestion that, a number of functions are intact and contributes to the weight of evidence that patient may, for example, be able to continue independently. Alternatively a grossly abnormal clock, is an important indicator of potential problems warranting further investigations or resource allocations. While, grossly abnormal clock demands immediate attention, questions regarding the importance of minor errors remain.

**Statistical analysis:** The data was analysed using The frequency and percentages were computed, Chi-square test was calculated to find out the goodness of fit i.e., the association between the dependent and independent variables. Impact of all the selected independent variables on the functional ability was carried out by using multiple regression. Age wise differences of the functional status of the respondents was computed using the Analysis of Variance Test.

## Results and Discussion

The mean scores of circle drawing by the sub sample by socio-demographic variables are presented in table 1. It is clearly seen that gender did not have any influence on circle drawing ability, while there was statistically significant association between place of residence and ability to draw a clock, the results favoring urban group, similarly the respondents from high income group have better scores on clock drawing, the association was also statistically significant. The similar trend was also observed in 't' test. These results imply, the impact of education on

ability to draw a clock. It was also observed from the drawing of sub sample that, the better educated, urban group have better ability because of impact of education irrespective of gender.

Table 1. Mean scores of clock drawing by demographic variables

Variables	Mean	SD	X2	t
1. Age				
60-65 yr.	7.31	1.88	3.696**	-
66-70yr.	7.13	1.68		
71+ yr.	7.57	1.81		
2. Gender				
Female	6.81	1.78	-	2.250 NS
Male	7.57	1.76		
3. Place of residence				
Rural	6.37	1.82	-	3.696**
Urban	7.68	1.66		
4. Marital status				
Without spouse	6.78	1.71	-	0.032 NS
With spouse	7.53	1.80		

\*\* Significant at 1 per cent level NS-Non Significant

The clock drawing test is used as quick scan for cognitive impairment and is used by many researchers on elderly. Adamis *et al* (2005) studied the performance of clock drawing test in elderly inpatients to detect the delirium. Using mixed linear model analysis they found that, cognitive impairment was the major factor associated with low clock drawing test scores ( $p < .0001$ ). Neither the presence nor the severity of delirium had additional significant effect on the clock drawing test. Thus, they could conclude that, the clock drawing test is a good detector of cognitive impairment, but not suitable for detection of delirium among the inpatient elderly. In an another study Huntzinger *et al*(1999) used the Clock drawing in the screening assessment of

cognitive impairment in an ambulatory care setting for 400 patients. According to this report, the clock drawing test might represent a quick screen for cognitive impairment in an older general/medical outpatient population, and might help identify patients not otherwise recognized as potentially unable to fully understand treatment recommendations.

Mean scores of domains of functional abilities by age cohorts revealed that( Table 2), age found to have significant impact on physical, psychomotor and cognitive functioning for the rest of the two domains there was no significant impact on age. The impact of age had significant effect on PF, PSF and CF. There is declining trend in these domains of FA as there is decline in age. It is also proved from many studies, degeneration and disuse work together leading to a general weakening and decline in ability (Smits *et al.* 1997), Corcorn (1987) also found that sensory integration decreases with age.

Table 2. Functional ability by age cohorts

Age	N	PF		PSF		CF		SEF		BF	
		M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
60-65	59	4.69	0.56	4.34	0.84	4.39	0.79	4.07	1.03	4.14	0.96
66-70	38	4.24	0.65	4.03	0.94	4.08	0.88	4.08	1.08	4.18	0.93
70+	28	4.04	0.96	3.54	1.00	3.75	1.00	3.61	1.17	3.57	1.17
Total	125	4.41	0.80	4.00	0.96	4.15	0.90	3.97	1.08	4.02	1.02
F		8.543**		7.435**		5.345**		2.032 NS		3.738 NS	

\*\* Significant at 1 per cent level      NS-Non Significant

Means by income level depict that, income had a significant impact on physical functioning (at 1 per cent level) and on socio-emotional functioning (at 5 per cent level) of probability(Table 3) , while for rest of the domains there is no significant impact of income level on mean values of domains of FA. The impact of income on PF, and SEF were significantly noticed because, as expected the income enhances the purchasing power of an individual where he can make use of some assistive technologies for PF. It is very well established that, the health

status, educational level, income level, decision making and life satisfaction are positively and significantly correlated (Nagi and Kaur, 1999).

Table 3. Functional ability by income levels

Income levels	N	PF		PSF		CF		SEF		BF	
		M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
Low	54	4.11	0.84	3.85	0.92	3.93	0.95	3.59	1.06	3.81	0.97
Medium	50	4.62	0.73	4.20	0.97	4.28	0.83	4.24	1.02	4.16	1.02
High	21	4.67	0.66	4.29	0.96	4.43	0.81	4.29	1.06	4.24	1.09
Total	125	4.41	0.80	4.06	0.96	4.15	0.90	3.97	1.08	4.02	1.02
F		7.149**		2.453 NS		3.332 NS		6.185*		2.080	

\*\* Significant at 1 per cent level      NS-Non Significant

Marital status (Table 4) had a significant impact on socio-emotional (at 1 per cent level) and psychomotor and sensory functioning (at 5% level of significant). The probable reason for marital status having a significant impact on SEF, PSF, and BF may again be attributed to the fact that, the positive feeling of presence of other spouse has a beneficial effect on all these domains of FA. The widowers were the worst hit among all the respondents.

Table 4. Functional Ability by Marital Status

Marital status	N	PF		PSF		CF		SEF		BF	
		M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
Widow	26	4.42	0.81	3.81	0.90	4.12	0.77	3.58	1.06	3.88	0.95
Widower	10	3.50	0.53	3.10	0.88	3.30	0.69	2.90	0.88	2.90	0.88
Married	89	4.51	0.77	4.25	0.91	4.26	0.91	4.20	1.01	4.19	0.98
Total	125	4.41	0.80	4.06	0.96	4.15	0.90	3.97	1.08	4.02	1.02
F		3.839 NS		4.217*		2.713 NS		4.84**		4.136*	

\*\* Significant at 1 per cent level      \* Significant at 5 per cent level NS-Non Significant

Functional ability by educational levels revealed that, education did not have any influence on any of the domains of the functional ability

Table 5 depicts the comparison of mean values of perceived data on domains of functional ability. Gender differences existed for cognitive functioning and behavioral functioning, while for the rest of other domains were not influenced by gender, revealing non-significant differences. These are in contrast to the results obtained by the main data may be because , the females in sub sample were educated and were in a homogenous group. They performed better in cognitive functioning and behavioral functioning than their male counterparts

The results also showed that, place of residence had its impact on psychomotor, cognitive and socio-emotional functioning in a statistically significant way. The impact of urban area on cognitive functioning, socio-emotional functioning were attributed to the access and use of the technological advances available in urban are might have enhanced their scores on these domains. There was also difference between the mean values of domains of functional ability of the elderly with the other spouse living and not living on psychomotor , socio-emotional functioning ( 1 percent level of probability) on behavioral functioning. The impact of widowedness was peculiarly observed in this sample which is mainly attributed to psychological distress, loneliness experienced by the respondents might have resulted in the differences in PSF and BF and on other domains.

Table 5. Comparison of scores of functional ability by independent variables

Variables	PF		PSF		CF		SEF		BF	
	M	Sd	M	Sd	M	Sd	M	Sd	M	Sd
Gender										
Female	4.50	0.77	3.95	0.91	4.17	0.85	3.74	1.11	3.93	0.77
Male	4.36	0.82	4.12	0.98	4.14	0.93	4.08	1.06	4.07	1.05
“t”-value	1.579 NS		1.498 NS		4.966**		0.38 NS		3.316**	



Place of residence										
Rural	4.20	0.87	3.66	0.91	3.80	0.93	3.40	1.06	3.66	0.97
Urban	4.49	0.77	4.22	0.93	4.29	0.85	4.19	1.02	4.17	1.01
“t”-value	2.604 NS		5.176**		11.253**		3.261**		0.104 NS	
Marital status										
Without spouse	4.17	0.85	3.61	0.93	3.89	0.82	3.39	1.05	3.61	1.02
With spouse	4.51	0.77	4.25	0.91	4.26	0.91	4.20	1.01	4.19	0.98
“t”-value	2.082 NS		3.474**		2.208 NS		3.962**		2.910*	

\*\* Significant at 1 per cent level \* Significant at 5 per cent level NS-Non Significant

The results imply that, Physical functioning , socio-emotional functioning is better among the elderly from higher income, hence the financial support to the elderly staying alone may be enhanced or the present rates may be modified. Psycho-motor and sensory functioning, Socio-emotional functioning and behavioral functioning were better among the elderly living with the spouse, hence the elderly staying without the other spouse alive may be given interventions in order to lead a healthy, normal and peaceful life. The results obtained from clock drawing test confirm the results obtained from the perceived data, hence there is a need to develop such quick screening tool not only for cognitive development, but also the other areas of functional ability. Functional ability is found to decline with age, however the successful case studies of elderly staying physically, mentally and cognitively sound may be made known to elderly, so as to make them feel wanted and useful. Cognitive functioning is influenced by gender as elderly men favor in cognitive functioning there is a need to educate elderly women regarding cognitive functioning. Elderly from urban area score better in Cognitive functioning and Psychomotor-social functioning , hence there is need to give intervention programmes for the elderly staying rural areas also for Indian elderly.

## Reference

- Adamis D., Morrison C., Treloar A, Mcdonald AJ and Martin FC. 2005. The performance of clock drawing test in elderly medical inpatients: does it have utility in the identification of delirium? *J. Geriatr Psychiatry Neurol* 2005 Sep;18(3):129-33.
- Corcorn, M.M. 1987, Using Sensory Integration Principles with Regressed Elderly Patients. *Occupational therapy in health care*, 4(2): 119-128.
- [http://www.neurosurvival.ca/Clinical Assistant/scales/clock\\_drawing\\_test.htm](http://www.neurosurvival.ca/Clinical%20Assistant/scales/clock_drawing_test.htm)
- Huntzinger JA, Rosse RB, Schwartz BL, Ross LA, Deutsch SI. 1992. Clock drawing in the screening assessment of cognitive impairment in an ambulatory care setting: a preliminary report. *Gen Hosp Psychiatry*. 1992 Mar;14(2):142-4
- Juby A., tench S. and Baker, V., 2002. The Value of Clock Drawing in Identifying Executive Cognitive Dysfunction in People with a Normal MMSE Score. *Canadian Med Assoc or its licensors* 15:167(8); 859-864.
- Nagi, B.S. and Kaur, K., 1999, Psycho-Social Characteristics of Muslim Elderly; an Empirical Investigation *Soc change*. 29(1 &2);47-63.
- Ramamurti, P.V. 2002. "Gero-psychology; East-West Scenario". *J Comm guidance and Res*. 19(2). 265-272.
- Smits, C.H.M., Deeg, D.J.H, Jonker, C., 1997 "Cognitive and Emotional Predictors of Disablement in Older Adults". *J Aging & Health*. 9(2):204-221.
- Sunderland T, Hill JI, Mellow AM *et al*. 1989. Clock Drawing in Alzheimer's Disease: A Novel Measure of Dementia Severity. *J Am Geriatr Soc* 37(8):725-729.