

# An Assessment of Drawing Age in Pre-School Children Using 'Draw-A-Man' Test

Raja S<sup>1</sup>, John BM<sup>2</sup>

## Abstract

**Introduction:** Goodenough-Harris 'Draw-a-Man' Test has been traditionally used as a simple tool to measure mental development in a child. There have very few studies looking at utility of 'Draw a man' test in the Indian subcontinent in the recent past. We carried out an assessment of correlation of drawing age with chronological age in pre-school children by the 'Draw- a- man test' and looked for any associations with respect to a deviation (delay or advancement) in the calculated drawing age. **Materials and Methods:** A cross-sectional descriptive study was conducted on 100 neurologically normal pre-school children between 36 to 72 months. The data was then analyzed with Pearson correlation and Chi square test on SPSS version 14.0 **Result:** There was a low positive correlation between drawing age and chronological age (Pearson correlation:  $r=+0.31$ ,  $p=0.002$ ). There were more boys ( $p=0.004$ ) and more children with prematurity ( $p=0.012$ ) in the group with low or equal drawing age compared to chronological age. **Conclusion:** In view of the low positive correlation found in our study, further studies with a larger sample need to be conducted to establish the 'Draw-a-man' test as a screening tool for mental age assessment in our subcontinent. We did find a significant association of deviation of drawing age from chronological age with respect to gender and prematurity.

**Key words:** Goodenough-Harris 'Draw a man' test, drawing age, chronological age, pre-school children

## Introduction

Goodenough-Harris 'Draw-a-Man' test has been used as a simple tool to measure mental development. It is a drawing test that gives information about the general aptitude level of young children. This is based on the fact that the nature and content of children's drawings are dependent primarily upon intellectual development. In the drawings of young children, a close relationship exists between concept development and general intelligence. Drawing is a form of expression and a child draws what he knows. The child exaggerates the size of objects which seem interesting or important and marked sex differences, usually in favor of the girls, are frequently observed. The drawing tests have been used since its conception by Florence L Goodenough early in the 20<sup>th</sup> century for a variety of evaluation such

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as those of personality, sensory deviates, intellectual development and learning differences<sup>1,2,3,4,5,6</sup>. Today, the children are exposed to a variety of environments against a backdrop of varying genotypic influences. Factors which may influence the cognitive functions include socio-economic status, parental education level, early pre-school or play school influence, influence of television, birth order etc. The various environmental influences may advance or retard the age interpretation by this test. There have been very few studies looking at either the correlation of drawing or

mental age assessed by Goodenough-Harris 'draw a man' test with chronological age in children from Indian subcontinent in the current context or a study aiming to look at any associations for a delay or advancement of age. With this background, the study was conceived to assess the utility of this simple and innovative test to assess mental age and also to look for any specific associations with respect to mismatch between the actual chronological age and age assessed by the 'Draw-a-Man' test.

## Materials and Methods

A cross-sectional descriptive study was conducted in a medical college and hospital in western India over a two month period to look at the correlation of age assessed by the Goodenough 'Draw-a-man' test and actual chronological age in neurologically normal pre-school children and to find any associations towards the reasons for their deviance from normal. We assumed that the Draw-a-man' test would give a reasonably good estimate of the mental age. A sample of 100 children between 36 and 72 months were taken (sample size based on the primary objective of assessment of correlation, taking a possible correlation coefficient of 0.5,  $\alpha=0.05$  and power of 0.8). The children were recruited into the study from immunization clinics, OPD and one pre-nursery school. Information with respect to the demographic profile and other study variables were collected using a pre-designed performa and mental age evaluated by the 'Draw-a-man' test. The data was analysed using appropriate statistical tests with the help of SPSS version 14.0.

## Results

The study population consisted of 100 children who were taken from the immunization clinic, OPD and one pre-nursery school. The profile of children studied is depicted in Table 1. The Male: Female ratio was 1.78:1. 94% children were of the birth order 1 or 2.85% children were born term. Only few (15%) had no outdoor play. 55% children had more than 1 hour of TV viewing. 84% children were going to formal schools. 91% of children had educated parents and 51% children belonged to upper middle socio-economic status.

The mean (SD, 95% CI) of the chronological age and drawing age in months were 58.95(7.34, 57.49–60.41) and 58.76 (10.39, 56.68–60.84) which showed no significant difference. In a comparison of drawing age with chronological age in the children, there were 50% who had equal or low age and 50% who had higher mental age compared to the chronological age. There

was a low positive correlation between drawing age and chronological age. The  $r$  value (Pearson correlation coefficient) was +0.31( $p=0.002$ ).

The association of drawing age with various factors is depicted in Table 2. The association of drawing age (advanced or delayed) with sex showed that the percentage of children with advanced drawing age was more in case of girls than in boys with a significant  $p$  value (0.004). Drawing age was low in most of the children born preterm when compared to term ( $p=0.012$ ). Comparison for outdoor play showed that children who did not have outdoor play had more likelihood of low drawing age (66% children who did not play had equal or low drawing ages). However, it was not statistically significant. Comparison for parental education also showed that children who had un-educated parents had a risk of equal or low drawing age (66% children who had uneducated parents had equal or low drawing age) but this too was not statistically significant.

**Table 1:** Characteristics of the study population

Characteristics	Variable	Total
Sex	Male	64
	Female	36
Birth order	1	50
	2	44
	3	4
	4	2
Preterm/term	Preterm	15
	Term	85
Outdoor play	Yes	85
	No	15
TV viewing in hrs/day	0	8
	0.5	8
	1	29
	2	38
	3	11
	4	5
Child's education	No education	16
	Nursery	3
	L.K.G	3
	U.K.G	74
	1 <sup>st</sup> STD	4
Parent's education	No education	9
	Upto 10 <sup>th</sup>	31
	Upto 12 <sup>th</sup>	30
	Graduate	26
	Postgraduate	4
Socio economic Status (Kuppuswamy scale)	Upper lower	29
	Lower middle	8
	Upper middle	51
	Upper	12

**Table 2:** Factors associated with mismatch between chronological age and drawing age

Factor	Variable	High drawing age	Equal/low drawing age	Total	Chi-square	p-value
Sex	Male	25	39	64	8.5	0.004
	Female	25	11	36		
Birth order	1	25	25	50	0.0	1
	2	22	22	44		
	3	2	2	4		
	4	1	1	2		
Preterm/term	Preterm	3	12	15	6.353	0.012
	Term	47	38	85		
Outdoor play	Yes	45	40	85	1.96	0.161
	No	5	10	15		
TV viewing in hrs/day	0	6	2	8	7.10	0.312
	0.5	2	6	8		
	1	17	12	29		
	2	16	22	38		
	3	6	5	11		
	4	2	3	5		
	5	1	0	1		
Child's education	No education	8	8	16	4.33	0.363
	Nursery	2	1	3		
	L.K.G	0	3	3		
	U.K.G	37	37	74		
	1 <sup>st</sup> STD	3	1	4		
Parent's education	No education	3	6	9	13.67	0.134
	Upto 10 <sup>th</sup>	17	14	31		
	Upto 12 <sup>th</sup>	16	14	30		
	Graduate	14	12	26		
	P.G.	0	4	4		
Socio economic status	Upper lower	14	15	29	3.32	0.344
	Lower middle	2	6	8		
	Upper middle	29	22	51		
	Upper	5	7	12		

**Discussion**

Goodenough ‘Draw-a-Man’ test has been traditionally used as a simple tool to measure mental development<sup>1-6</sup>. There have been studies which showed good correlation between mental age assessed by ‘draw a man’ test with tests of IQ such as Stanford-Binet test with correlations ranging from 0.45 to 0.72<sup>7,8,9,10</sup>. Hence we presumed that the ‘draw-a-man’ test could give us a good estimate of the mental age. With this assumption we wanted to assess the correlation of mental age with chronological age and see whether there were any significant associations

between selected variables with respect to a deviation in mental age in today’s context in our country.

Our study population consisted of 100 children between the age group of 36-72 months. There were more male children in our study (M: F= 1.78:1). We had fewer children who had ‘no education’ (16%) as opposed to children with ‘some form of education’ (84%). We had less number of children in the group whose parents were uneducated or belonged to poor socio-economic strata. This distribution of sample population could have affected our results. In our study, there was a low positive correlation between

drawing age and chronological age ( $r= +0.31, p=0.002$ ) though there was no significant difference between the mean chronological age and drawing age. Fifty percent children had advanced drawing age and 50 % had equal or low age compared to the chronological age. This could have been because of any of the factors mentioned in Table 2. In a similar study by Basgul et al, 75 out of 175 (42.85%) children had same or high drawing age and 100 out of 175 (57.14%) had low drawing age<sup>11</sup>. In their study, low birth weight and lack of formal schooling was associated with lower drawing age. In our study, there were more boys ( $p=0.004$ ) and more children with prematurity ( $p=0.012$ ) in the group with low or equal drawing age compared to chronological age. There was also a statistically insignificant association of the low or equal drawing age with lack of outdoor play (66% Vs 33%,  $p=0.161$ ) and absence of parental education (66% Vs 33%,  $p=0.134$ ). Birth order, TV viewing, child's education and parent's socio-economic status did not have a statistically significant association with mismatch in drawing age and chronological age. Our study showed a low positive correlation between drawing age and chronological age and we found a significant mismatch between the two ages with respect to prematurity and gender. An important limitation of our study was that we assumed that the 'Draw-a-man' test would correlate reliably with the mental age. This need not have been correct and could have been addressed if we had carried out a formal mental age assessment of the children as part of the study. However, this was not possible due to the nature of the study.

## Conclusion

This study showed a low positive correlation between drawing age and chronological age and we found a significant mismatch between the two ages with respect to prematurity and gender. We suggest larger studies evaluating the relationship between drawing age assessed by the 'Draw-a-man' test, mental age assessed by formal psychological assessment and chronological age and analyzing factors responsible for the deviation in the various ages, to validate our findings and establish the role of Goodenough-Harris 'Draw-a-man' test.

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**Conflict of Interest:** None

**Permission from IRB:** Yes

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