Gender Difference in level of Intelligence and Social Quotient among Children with Autism Spectrum Disorders

K. G. Dhanesh[*], S. Karthikeyan[**]

[*] Department of Clinical Psychology, CRC for persons with Disabilities, Kozhikode.
[**] Department of Clinical Psychology, NIEPMD, Chennai.

Abstract- Autism is widely regarded to be the most severe of the childhood psychiatric conditions. It is a developmental disorder and is diagnosed on the basis of abnormal social development, abnormal communicative development, and the presence of narrow, restricted interests and repetitive activity, along with limited imaginative ability. The symptoms are usually evident by the age of three years. All the levels of IQ can occur in autism, but there is significant mental retardation in some three-quarters of the cases. The present study was to compare the Level of Intelligence, Social Quotient, Communication Impairments and Activity level among male and female children with Autism Spectrum Disorders (ASD) and the following results are drawn. There is no significant difference in social quotient, activity level and non-verbal communication between male and female children with Autism Spectrum Disorders. Male children were found to have better level of intelligence and verbal communication compared with female counterparts. Results discussed in detail.

Index Terms- Intelligence, Social Quotient, Communication Impairments, Autism Spectrum Disorder

I. INTRODUCTION

Autism is widely regarded to be the most severe of the childhood psychiatric conditions (Frith, 1989; Baron-Cohen and Bolton, 1993). It is diagnosed on the basis of abnormal social development, abnormal communicative development, and the presence of narrow, restricted interests, and repetitive activity, along with limited imaginative ability (DSM-4, 1994). Such children fail to become social, instead remaining on the periphery of any social group, and becoming absorbed in repetitive interests and activities, such as collecting unusual objects or facts. It is a tragedy for their families who work tirelessly to attempt to engage with and socialize their child, mostly with very limited results.

It is a confusing disorder because it presents itself in unique ways in each affected individual. Some children with autism may show severe cognitive impairment, whereas others may show incredible skills in math, memory, or art, but are severely lacking in socials skills. Some individuals cannot speak, whereas others are verbal, although their speech may lack meaning to those around them. Many individuals with autism insist on sameness in their environment, exhibit repetitive behaviours such as rocking,

engage in routinized, unimaginative play, and seem to be aloof or unaware of their environment and the people in it. (Gerlach, E.K., 1996).

Although the degrees of severities vary greatly from individual to individual, one common thread among those with autism is the impairment of communication skills in a social context. Lack of eye contact, rigid or concrete thinking, difficulty in processing information, sensory problems, anxiety, and echolalic speech are just a few of the factors that interfere with an individual's ability to create reciprocal social interactions.

Prevalence Rate

Family studies have shown that first degree relatives of people with autism have a raised risk of autism, compared to population baseline levels (Folstein and Rutter, 1988). For example, whilst estimates of autism in the general population range from 1 in 2500, to 1 in 1000 (Wing and Gould, 1979), the sib risk rate in families with a child with autism is 3%. This is 50- 100 times higher than the population baseline rate. Such family data could imply an environmental or hereditary cause. However, twin studies implicate a genetic aetiology more persuasively. The concordance rate for autism among monozygotic (MZ) twins is 36%, whilst the concordance rate among dizygotic (DZ) twins is no higher than the sib risk rate (Folstein and Rutter, 1988; Bolton and Rutter, 1990). Steffenberg et al (Steffenberg et al, 1989) found an even stronger difference between MZ and DZ concordance rates (91% vs 0%). Whilst such twin studies are not watertight evidence for hereditary factors, they are strongly suggestive of it. In most cases, development is abnormal from infancy and, with only few exceptions, the condition becomes manifest during the first 5 years of life.

Cognitive Profile

Regarding the cognitive profile of children with autism, consistent strengths and weaknesses have been reported and replicated. Frith (1989) puts this in the following terms: the normal child and adult has a disposition to"see the whole and not the parts", whilst children with autism instead "see the parts but not the whole". More precisely, it is not that children with autism cannot see whole objects or scenes. Rather, they appear to be especially gifted at spatial analysis, and they focus in on detail. Secondly, children with autism perform *worse* than mental-age matched control groups on selective aspects of social cognition, especially on tests involving the ascription of mental states to other people (Baron-Cohen, Leslie, and Frith, 1985). This latter

capacity is referred to as the use of a "theory of mind", or "mindreading". Mindreading is held to be the normal way in which we make sense of and predict events in the social world. The normal person interprets actions in terms of what the agent's likely *intentions* are, and what the agent might be *thinking, intending, wanting* etc., This is also the strategy normal people use for decoding communication. Children with autism are correspondingly described as suffering from "mindblindness", in failing to recognize mental states as underlying people's behaviour and communication. When intelligence is considered all the levels of IQ can occur in autism, but there is significant mental retardation in some three-quarters of the cases (ICD 10). It is usual but not invariable, for there to be general cognitive impairment but the disorders are defined in terms of behavior that is deviant in relation to mental age (whether the individual is retarded or not)

II.   METHODS

The objectives of the present study were to find out the differences between male and female children with autism with regards to the level of Intelligence, Social quotient, verbal & non verbal communication and activity level. The samples consist of children those who are diagnosed with Autism and related disorders by a concerned Clinical Psychologist at a special school located in Pondicherry. The sampling technique used was convenient sampling with a total sample size of 50 among which 34 are males.

Inclusion criteria
1) Age range of 03-18
2) Both males and females.

Exclusion criteria
1) Children with co morbid conditions other than mental retardation.
2) Children with other chronic physical illness.

Tools Used

1. Developmental Screening Test (DST)
Developmental Screening Test developed by Bharath Raj (1977, 1983) was designed for the purpose of measuring the developmental sequences of children from birth to 15 years of age. It consists of 88 items which represent the behavioral characteristics of respective age levels. At each age level, items are drawn from behavioral areas, like motor development, speech, language, and personal-social development.
Appraisal of a child can be done in semi-structured interview with a parent or a person well acquainted with the child. The IQ calculator incorporated with the test folder helps in ready computation of IQ from mental age and the chronological age of the child.
Reliability and Validity:
DST showed very high positive correlation +.7215 to +.9968 with other intelligence or developmental tests.   Inter-scorer reliability (+.928) and test retest reliability (.98) were also found to be high and satisfactory.

2) Vineland social maturity scale (VSMS)
The Vineland social maturity scale was originally devised by E.A. DOLL in 1935 and since then this test is being used in many parts of the world. It proved itself to be uniquely useful instrument in measuring social maturity of children and young adults.

Administration and scoring
The administration should be carried out in a semi-structured informal atmosphere by having the mother along with the child or having the child alone depending upon the demands made by the items. If the particular characteristic described by the item has clearly emerged, a '+' mark may be made on the left side of the item. But if the evidence proves that it has not emerged still a '−'mark may be put on the left side of the item. But if the clinician feels confident that the characteristic might possibly have emerged but in the clinical situation it cannot be assessed, based on supplementary information provided by the mother half credits within the range of otherwise continuous plus credits
At the end of assessment Full and Half credits may be counted. If the total score falls exactly on the last item of an age level, the child is given the full Social Age at that age level.

The procedure for obtaining the Social Age from the Raw is as follows.

$$S.\,Q. = \frac{Social\ Age}{Actual\ Age} \times 100$$

The interpretations of S.Q. are on similar lines as that of I.Q. except that S. Q.s have a social life reference.

Reliability and Validity:
Research studies (Goulet and Barelay 1962); have shown a consistent and high correlation between VSMS Social Age. (S.A.); and the Stanford Binet M.A., DOLL reported a correlation of + = 0.85 and Patterson (1943) reporting a correlation of + = 0.96 with the Binet scale on a sample of normal children.

3) Childhood Autism Rating Scale (CARS)
The Childhood Autism Rating Scale (CARS) is developed by Schopler, E et al. and has been in use since 1971. (Schopler, E. et al, 1998). It is a 15 item behavioral rating scale developed to identify children with autism and to distinguish them from developmentally handicapped children without the autism syndrome.
Scoring
To score the CARS, each of the 15 items is given a rating from 1 to 4. A rating of 1 indicates that a child's behavior is within normal limits for a child of that age where as score of 4 means that the child's behavior is severely abnormal compared with children of the same age. In addition to these 4 ratings the midpoint between item (1.5, 2.5, 3.5) are to be used when the behavior appears to fall between two categories.
Reliability:
Reliability of the CARS using coefficient alpha is 0.94 (N=1,606). The average inter-rater reliability of 0.71 was obtained, indicating good agreement between the raters.

Validity:

The criterion-related validity of the CARS was determined through a comparison of total score to clinical ratings obtained during the same diagnostic session. The resulting correlation, r= 0.84 (p< .001), indicates that the CARS scores have high validity when compared with the criterion clinical ratings.

The order of presentation of the psychological tests for all subjects was the same. They were any one of the Intellectual assessment mentioned, Vineland Social Maturity Scale and Childhood Autism Rating Scale. Tests were administered individually for all subjects in distraction free setting. Administration of tools approximately took 45 minutes to one hour on an average.

III. RESULTS AND DISCUSSION

The analysis was done by using percentages, and t-test. The following results are drawn. Subjects used for the study, with regard to gender, 68% were males and the rest 32% were females.

Table 1: Descriptive Statistics of Samples

Variable	Min.	Max.	Mean (SD)
Age	3.5	18.5	9.5 (3.10)
IQ/DQ	23	105	57.26(20.05)
SQ	20	80	45.31(17.2)
Severity	1.5	3.5	2.26 (0.56)
VCI	2	4	3.02 (0.71)
NVCI	1	3	2.38 (0.66)
Activity level	1	3	1.79 (0.717)

Age of samples ranges from 3 ½ years to 18 ½ years, Intelligence quotient ranges from 23 to 105 with a mean of 57.26. Severity of the disorder ranges from 1.5 to 3.5, where 1 indicates minimal dysfunction and a score of 4 indicates maximum level of dysfunction. Verbal communication ranges from 2 to 4 in a four point scale where 1 indicates no impairment in the verbal communication and a 4 indicate maximum impairment with regard to the age of the subject. Non verbal communication and the level of activity range from 1 to 3 in a four point scale.

Table 2: Significance of Difference between Mean Scores of Variables among Children with Autism Spectrum Disorders

Variable	Group	Mean	SD	t	P
IQ/DQ	Male	61.56	19.209	3.161	0.003
	Female	39	12.048		
SQ	Male	47.06	17.019	1.373	NS
	Female	37.88	17.008		
VC	Male	2.21	2.91	-2.187	0.035
	Female	2.81	3.5		
NVC	Male	2.35	0.691	-0.562	NS
	Female	2.5	0.535		
AL	Male	1.76	0.741	-0.387	NS
	Female	1.88	0.641		

NS: Not Significant

The t-value was found to be 3.161 for IQ/DQ. It is seen from the table that male children with ASD have better intelligence when compared to female counterparts. Similar findings were reported by Lord, C. et al(1982), when comparisons made between male and female children with autism, males scored higher in non-verbal IQ and social quotient. A Study done by Tsai, L.Y., & Beisler, J.M., (1983) shows autistic females were more seriously affected in intellectual abilities and receptive language than autistic males.

The t-value was found to be 1.373, for social quotient and -0.387 for activity level, indicating there is no significant difference between both the genders with regard to these variables.

When communication impairments are compared, the t-value was found to be -2.187 for verbal communication and it is evident from the table that verbal communication impairments more in females when compared to males. A Study done by Tsai, L.Y., & Beisler, J.M., (1983) shows autistic females were more seriously affected in receptive language than autistic males, which in turn helps the development of verbal communication in a better way in males than in females. The t- value was found to be -0.562 for non-verbal communication and from the table it is evident that there is no significant difference between both the genders with regard to non-verbal communication.

There is no statistically significant difference (-0.387) found when compared the level of activity of male & female children with ASD which indicates that the level of activity in both the genders of children with autism shows no variations.

Present study concludes that though Autism is more prevalent among males (male to female ratio 4:1); females are affected more severely than males in terms of Intellectual functioning and verbal communication. The finding will be helpful in making diagnosis & in treatment planning such as communication interventions, skill development and behavior management. It has been estimated that the effective management of children with ASD attending special education and other conjoint therapies depends upon the accurate diagnosis and recognizing possible strengths & weakness of individual child.

IV. SUMMARY AND CONCLUSION

The present study was carried out to find out and to compare both the genders in terms of the level of Intelligence, Social quotient, verbal and non verbal communication and activity level among children with Autism Spectrum Disorders (ASD). The sample of present study consists of 50 children with ASD (34 Males and 16 Females). Descriptive statistics and t test used for analysis and following conclusions are drawn. There is no significant difference in Social quotient, activity level and non-verbal communication between male and female children with Autism Spectrum Disorders. Male children were found to have better level of intelligence and verbal communication compared with female counterparts.

Limitations of the study

Socio-demographic variables are not systematically studied in the present and it is confined to a small sample of children with ASD.

Recommendations for further study

Larger samples of children with ASD of various types, duration, severity of disorder, effect on clinical presentations based on coping styles of family members, influence of various socio demographic variables in IQ, SQ and severity etc are important variables to be studied for the generalization of the results.

A long term & large scale study will help to find out the differences in child rearing practices, if any or differences in existing biological make up of nervous system among males and females causing the significant differences noticed between males and females.

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AUTHORS

First Author – K G Dhanesh, Clinical psychologist, CRC for persons with disabilities, Kozhikode. Email: dhmala@gmail.com

Second Author – S Karthikeyan, Lecturer in Rehabilitation Psychology, National Institute of Persons with Multiple Disabilities (NIEPMD), Chennai.
Email: karthikeyan.clinpsy@gmail.com.

Correspondence Author – K G Dhanesh, Clinical psychologist, CRC for persons with disabilities, Kozhikode. Email: dhmala@gmail.com. Mobile: +918907845766