

Neuropsychological and Behavioural Evaluations

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The purpose of this study was to collect data on the prevalence of Learning Disabilities (LD) and Behaviour Disorders (BD) in a developing country like India. Epidemiological data was obtained for a population of 333 children, ages 3-14 years. An important referral complaint was speech and language delays. Almost half of the referred population (46%) was diagnosed with LD and 10% with BD (mainly with Attention Deficit Hyperactivity Disorder) through use of developmental, neuropsychological and psycho-educational assessments. Birth encephalopathy (including low birth weight and preterm birth) was present in 65% of the total population. Male to female ratio of the referred population was 3:1. Accurate data on prevalence of LD and BD is necessary for the development of appropriate assessment and intervention strategies.

Keywords: Prevalence, Epidemiology, Learning disabilities, Behaviour disorders.

There is an urgent need to pay attention to the cognitive and emotional development of children in developing countries. Professionals confronted with this task face a number of challenges. Services have to be planned in a rational way, keeping in mind the needs of the local population. Feasible and cost effective models of service delivery have to be explored (Rahman, Mubbashar, Harrington & Gater, 2000). There is often a scarcity of trained manpower to assess and provide intervention for these problems.

A considerable number of epidemiological studies have been conducted on developmental difficulties and mental health problems of children in the western world (Brandenburg, Friedman, & Silver 1990; Costello, 1989) as well as in countries like India, Sudan, Columbia, Philippines and China (Hackett, Hackett, Bhakta & Gowers, 1999; Giel, de Aranga, Climent, Harding, Ibrahim, Ignacio, Murthy, Salazar, Wig & Younis, 1981; Xianchen, Kurita, Guo, Tachimori, & Ze, 2000). From these studies, estimates of the prevalence rates of these difficulties in children

range from 9% -30%. There have been some prevalence studies of the different disabilities in specific segments in India. These have extended to surveys in urban (Verghese & Baig, 1974) and rural areas (Nandi, Ajmay, Ganguly, Banerjee, Boral, Ghosh & Sarkar, 1975). These studies have mainly focused on physical disabilities (visual, speech, hearing, orthopedic), intellectual retardation, and psychiatric disturbances (Anand & Patel, 1983; Venkatesan & Rao, 1996; Arya, Venkatesan, Prakasam & Menon, 1997). Information about prevalence of Learning Disabilities and Behavior Disorders in India is scarce. This is also due to the fact that these difficulties are, as yet, recognized by very few states in the country.

Knowledge about prevalence is important to convince government bodies and fellow professionals that these difficulties pose an important public health issue, as well as to help prioritize high-risk groups and thus provide preventive services.

The present study aims to illustrate the prevalence of different developmental

difficulties and mental health disorders (Learning Disabilities, Behaviour disorders, Developmental delays, Mental/Intellectual retardation, Emotional difficulties) across a referred population.

Method

Sample:

A sample consisting of 333 subjects were studied. Of these, 242 were males and 91 were females. The age range extended from 3-14 years. All the children were from an urban population. These subjects were referred to the center for evaluations by parents or referring agencies – i.e. pediatricians, psychiatrists, neurologists, regular schools – who observed manifestations of difficulties in learning or anomalies in behaviour.

Instruments:

Weschler Intelligence Scale for Children-Indian adaptation (WISC) developed by Bhatt (1973). This test measures the verbal as well as non-verbal intelligence of the student using the verbal and performance scales. The sub-test scaled scores range from 0-20 with an average of 10. Composite scores include the Verbal IQ, Performance IQ and the Global IQ. Test-retest reliability coefficients have been obtained in the range of .81-.97. Inter-test correlations have been reported in the range of .70-.86.

Woodcock-Johnson Psycho-educational Battery-Revised (WJ-R) (Woodcock & Johnson, 1989-1990): This is a wide range comprehensive set of individually administered tests for measuring achievement. This test yields age equivalent and grade equivalent scores for all the sub-tests. The sub-tests can be grouped into reading, written language, and Math clusters. None of the sub-tests are timed tests. Derived Standard scores (SS) and Percentile ranks (PR) are peer comparison statements. The reliabilities are generally in the high .80s and low .90s for the tests and in the mid .90s for the clusters. The correlations of the

achievement clusters with other measures of achievement range from .50 to .70 for the different age levels.

Curriculum based Assessment is a non-standardised, informal assessment tool. The child is given tasks requiring the use of reading, written language and Math skills. These tasks are designed on curriculum-based material. These are not time-bound. The main objective is to assess the reading, writing and math skills of the student as per the curricular requirements.

Test of Auditory-Perceptual Skills-Upper Level (TAPS-UL) (1994) and **Test of Auditory-Perceptual Skills-Revised (TAPS-R)** (1996) were developed by Gardner. These tests were developed to diagnose subjects with auditory-perceptual disorders that can interfere with learning. They measure seven areas of auditory-perceptual skills. The TAPS-UL is to be used with subjects 12-18 years and the TAPS-R with subjects 4-12.11 years. Total group reliability coefficients for the TAPS-UL subtests range from .67 to .82. The reliability coefficients for the total score for the TAPS-R ranged from .85 to .90. Reliabilities from individual subtests ranged from .35 to .92.

Bender Visual Motor Gestalt Test (BVMGT) was developed by Bender (1938). This test consists of simple designs, which have to be copied on a plain, unruled paper by the student. The test is used variously for assessment of visual motor development, implications of brain damage and psychological disturbance. The 'Developmental Bender Scoring System' for children aged 5 – 11.11 yrs, developed by Koppitz is used to transform the scores. Test-retest Reliability coefficients of 0.81 are reported.

Ross Information Processing Assessment – (RIPA-2) (1996) & **Ross Information Processing Assessment-Primary (RIPA-P)** (1999) was developed by Ross-Swain. These tests quantify and describe

cognitive-linguistic deficits in individuals. The RIPA-2 (1996) is used for individuals age 13 onwards and the RIPA-P (1999) with children 5-12.11 years. The RIPA-2 is used with individuals who experience confusion, disorientation, or altered level of awareness; the RIPA-P provides useful information on the processing skills of children with learning difficulties. The RIPA-2 consists of 10 subtests whereas the RIPA-P consists of 8. These include the areas of Recent Memory Temporal Orientation, Spatial Orientation, Recall of general information, Abstract Reasoning, Organization, Auditory Processing & Retention. The standard scores on these subtests provide the composite Information Processing Quotient (IPQ). Internal consistency reliability of the RIPA-2 subtests yielded coefficients ranging from 0.67 -0.91. Correlations with other cognitive measures range from 0.56 to 0.89. The coefficients of .99 for RIPA-P provide convincing evidence of test scorer's reliability. Composite inter-correlations indicate coefficients of .53 to .64 providing evidence of the validity of the RIPA-P.

Children's Personality Questionnaire (CPQ) was developed by Porter and Cattell in 1968-69, and then revised in 1972. The CPQ is an instrument that measures fourteen distinct dimensions or traits of personality. It can be administered to individuals between ages 8 to 12 years. It is a paper pencil task and the individual has to work independently on this test. Test-retest reliability coefficients extend from 0.56-0.84 for the different factors across forms A & B. Construct validity coefficients are seen to range from 0.53 to 0.95 for the different factors across forms A & B.

The High School Personality Questionnaire (HSPQ) was developed by Cattell and Johns in 1968-69 and later revised in 1972. It is an upward extension of the CPQ and can be administered to individuals between ages 12 to 18 years. Short term test-retest reliability coefficients of 0.70 to 0.80 and

long term reliability coefficients of 0.50 to 0.60 were obtained.

Children's Apperception Test (CAT) was developed by Bellak and Bellak (1949, 1965). An Indian adaptation of the same was done by Uma Choudhury (1967). The Children's Apperception Test (CAT) is a projective test for use with children of age group 3- 10 years. This is used to assess mainly for the presence of emotional conflict. Experts have called into question the reliability and validity of the test.

Scale for Assessing Emotional Disturbance (SAED) was developed by Epstein and Cullinan (1998). It is a scale that assists in the identification of persons aged 5-19 years who may be having emotional disturbances. It contains seven sub-scales totaling 52 items, and a single item that focuses on overall educational performance. The test has a strong inter-rater reliability nearing .80.

Attention Deficit/Hyperactivity Disorder Test (ADHDT) was developed by Gilliam (1995). It is a standardized, norm-referenced test that contributes to the diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD). It comprises of three subtests: Hyperactivity, Impulsivity and Inattention. It is designed for use with persons from ages 3 to 23 years. Raw scores are converted to standard scores which can then provide an ADHD Quotient. The ADHDT demonstrates internal consistency coefficients above .90. This test has strong-moderate validity with Conner's ADHD rating scale.

Seguin Form Board-Indian adaptation (SFB) was adapted by Goel and Bhargava (1990). This test aims at measuring the global non-verbal intelligence of children (ages 3-15 yrs). The tasks in this test indicate the subject's ability for motor dexterity, visual motor coordination, spatial organization and speed of performance. Correlation of this test with other tests of intelligence and social maturity was seen to range from 0.31-0.50.

Developmental Activities Screening Inventory (DASI-II) was developed by Fewell, and Langley (1984). The DASI-II was designed as a screening measure for children functioning between the ages of 0-60 months. It incorporates 67 test items to tap a variety of skills such as fine-motor coordination, cause-effect relationship, size discrimination, memory, etc. The responses provide a Developmental Age (DA) and Developmental Quotient (DQ). Reliability and validity studies have yielded correlation coefficients ranging from 0.87-0.95 with other measures of cognition.

Vineland Social Maturity Scale (VSMS) was developed by Doll in 1935. Indian adaptation was done by Malin (1992). The VSMS gives an index of the child's social & adaptive development and yields a Social Quotient. The Indian adaptation charts development till 15 years of age. Correlation coefficients ranging from 0.85 – 0.96 have been obtained from a sample of children with normal development

Gilliam Autism Rating Scale (GARS) was developed by Gilliam (1980). The GARS is a behavioural checklist that helps identify persons who are autistic. This scale checks for stereotyped behaviours, communication, social interaction and developmental disturbances. The scale can be completed by parents and professionals, who have knowledge of the subject's behaviour. The GARS is appropriate for ages 3 through 22 years.

The Childhood Autism Rating Scale (CARS) was developed by Schopler Reichler and Renner (1999). The Childhood Autism Rating Scale (CARS) is a 15 item observation rating scale developed to identify children with Autism aged 2 years and above, and to distinguish them from developmentally handicapped children without the autism syndrome. It further distinguishes children with autism in the mild/moderate/severe range. The test-retest reliability indicated a correlation of

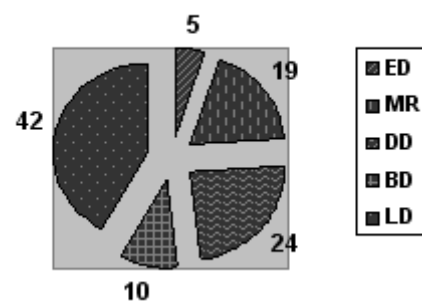
.88, and a criterion related validity coefficient of .88 indicating that the CARS results are in agreement with expert clinical judgments.

Gilliam Asperger's Disorder Scale (GADS) was developed by Gilliam (2001). The GADS is a developmental rating scale that helps identify persons, aged 3-22 years, who have Asperger's Disorder. The scale checks for social interaction, restricted patterns of behaviours, cognitive patterns, pragmatic patterns and developmental disturbances. GADS demonstrates moderate to strong estimates of internal consistency; all core subscales had coefficient alphas of .70 or greater.

Background information about family, developmental history and educational history of the child was collected through a Case History data form completed by the parent/guardian.

Procedure:

The evaluations had been individualized to suit the presenting complaint, and were conducted by clinical and counseling psychologists. The diagnoses (primary and secondary) reported in the assessment report, as per the DSM-IV (1994) criteria, were finally used in the prevalence study.



BD includes primarily ADHD
DD includes Speech and Language impairments, Autistic spectrum

Fig. 1 indicates distribution of the various subcategories of disorders seen in our sample was LD 42%, BD 10%, DD 24%, MR 19%, and ED 5%.

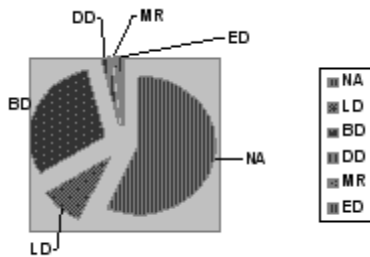


Figure 2: The distribution of the secondary diagnosis was LD 9%, BD 30%, DD 2%, MR 1%, and ED 1%. 57% were given no secondary diagnosis (NA)

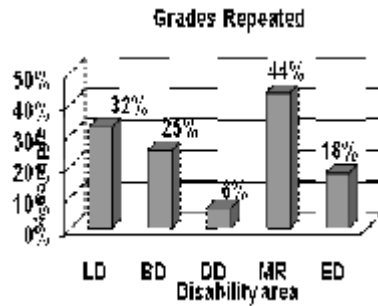


Figure 6 The distribution of cases showing grades repeated was seen as LD- 32%, BD - 25%, DD- 6%, MR- 44%, and ED -18%

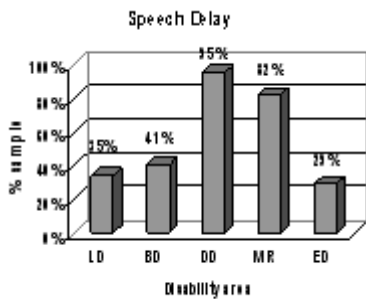


Figure 3 Each developmental delay was present across most of the subcategories of disorders.

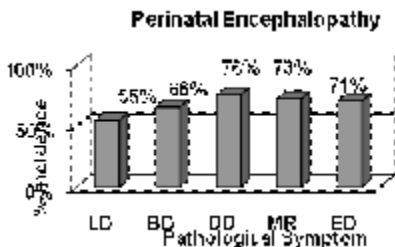


Figure 4 indicates that greatest birth encephalopathy was present in the subcategories of developmental disorders and mental retardation.

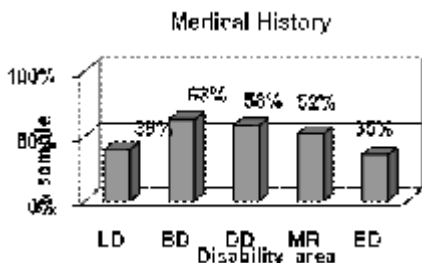


Figure 5 An abnormal medical history among the group with behaviour difficulties.

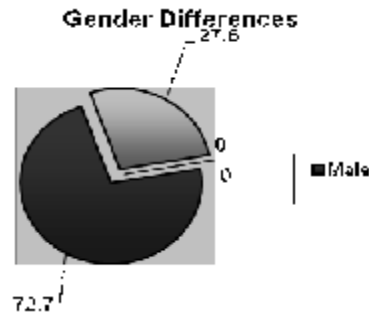


Figure 7 The results are indicative of either a true gender difference in the prevalence of the disorders or a referral bias (by parents/ teachers).

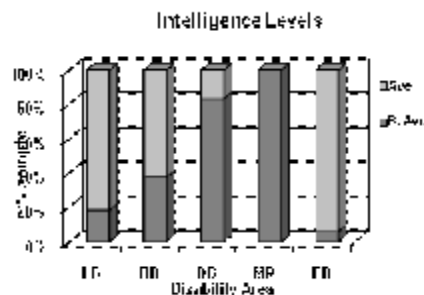


Figure 8 Results of the study of the intelligence levels (global I.Q.) among the different groups

Discussion

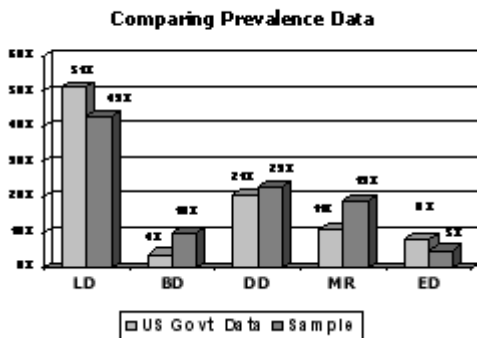
In countries which are economically developed, specialized professional groups have evolved to exclusively manage different aspects of the emotional and cognitive development of the child (Rahman, et.al,

2000). Scarcity of trained manpower and economic difficulties has prevented this from occurring in the developing countries, with the exception of metro cities. However, research and dissemination of its findings would surely lead to increased awareness and improvement of intervention practices.

As seen from the results of the study, amongst those directed for evaluation, a significant percentage were diagnosed as having learning difficulties (46%) and behaviour difficulties (10%-mainly ADHD). Research shows prevalence of LD in the age group of 6-21 years in the U.S. to be 51% of

and treatment (Pineda, 1996). Results of the present study show that 10% of the referred population had a primary diagnosis of behaviour disorders (mainly ADHD) whereas 30% of the evaluated population had a secondary (concomitant) diagnosis of behaviour disorders. The findings indicate a significant presence of the problem. There is thus a great need to emphasize the importance of recognizing this condition to the caretakers of children.

Figure 10 also indicates a higher rate of MR in the current study as compared to western data. This maybe due to poor prenatal care in developing countries and has potential for improvement in the future.



BD includes primarily ADHD

DD includes Speech and Language impairments, Autism, and TBI

Fig.9 US govt. data from Digest of Education Statistics (US govt.), 2000 (age grp.6-21 yrs)

According to conservative estimates, 5-8 % of the school going population has some form of learning & behavior disorders (Lerner 2000). Prevalence data of this kind is not available in India. Prevalence rates for ADHD reported in the literature range from 5% to 25% (Dykens, 2000; Pineda, 1996; Shue and Douglas, 1992). At least 40% of children with ADHD have also met the criteria of conduct disorders in different neuro-epidemiological studies. These figures thus indicate that ADHD presents a pediatric disorder that needs special attention with respect to prevention

Birth encephalopathy

A significant number of children in the study were seen to suffer from birth related difficulties (pre-term birth and low birth weight). This may have important implications for healthcare in developing countries. A longitudinal study (Hille, Ouden, Bauer, Oudenrijn, Brand, & Verloove-Vanhorrick 1994) of school performance of 813 children at nine years of age with a history of being very pre-term and very low birth weight showed that 19% of the children were in special education. Of the children in mainstream education, 32% were in a grade below the appropriate level for age, and 38% had special assistance. Studies indicate an increased risk of everyday memory difficulties in populations of pre-term children (Briscoe, Gathercole, & Marlow, 2001). These studies further highlight the importance of improved prenatal care in reducing co-morbidity in this subset of population.

Speech and language impairment

An important referring complaint was of speech and language impairment, with probable secondary manifestation of autistic traits. Speech and language impairment was seen to occur concomitantly across most of the other categories of developmental

difficulties and mental health disorders in the study.

Studies of normally developing children have demonstrated that learning to read is strongly related to early language skills. (Snowling, Bishop & Stothard, 2000; Goswami & Bryant, 1990). Links between language development and literacy are also evident in retrospective studies of children with developmental dyslexia and it is well established from epidemiological studies that delays and difficulties in language development are more common in children with dyslexia than in control samples (Kinsbourne & Warrington, 1963; Naidoo, 1972). Studies indicate that children with delays in the acquisition of oral language skills, phonological deficits (Gallagher, Frith & Snowling, 2000; Scarborough, 1990) and speech-language impairments frequently report a high incidence of reading difficulties (Larrivee & Catts, 1999; Stackhouse & Wells, 1997; Tallal, Allard, Miller & Curtis, 1997). Children who have problems in both oral language and phonological processing are at the greatest risk of failure. Data from the current study also indicates that a significant number of children primarily diagnosed with reading disability had a history of speech delay and showed deficits in phonological processing.

The current study also showed the co-occurrence of a speech delay and autistic traits. It was seen that the referring complaint of speech and language impairment was eventually primarily diagnosed as Autism. A study by Howlin, Mawhood, and Rutter (2000) tends to confirm the view that there are close links between the two conditions. Prevalence rates for autism/PDD across different studies range anywhere from 2% to 41% (Dykens, 2000).

Gender differences

The male to female ratio across the different disorders is seen to be 3:1 in our complete sample. As this was a random

population sample, the gender difference is indicative of either real differences in the population or a referral bias. Comparative literature shows the male-to-female ratio being 4:1 for autism, 3:1 for Aspergers' syndrome, 3:1 for ADHD (Dykens, 2000). Studies on reading disabilities (Badian, 1999; Rutter & Yule, 1975) have generally shown the ratio to be 3:1. Finucci and Childs (1981) concluded that more boys than girls have dyslexia, but the extent of the difference in the ratio depends on how the disorder is defined and how cases are identified. An epidemiological study however indicated no gender difference and referral bias was the explanation for those differences seen in the gender ratio (Shaywitz, Shaywitz, Fletcher, & Escobar, 1990). Another large epidemiological study indicated that although the prevalence of a reading disability was the same for boys and girls, boys were more likely to be identified by teachers as in need of learning disability programs (Flynn & Rahbar, 1994).

Conclusion

Greater awareness for early identification and intervention is required. Accumulating research shows that to maximize intellectual growth, efforts must begin during the first three years of life (Lerner, 2000). Early identification and intervention is possible only if the methods of diagnosis are sensitive and specific (Lerner, Lowenthal & Egan, 1998)

The largest number of referrals was for speech delay and academic disorders. This could be because these two areas have obvious implications in the child's social development. Speech and language impairments are seen to be definite precursors of academic difficulties later (Snowling et al, 2000). Large scale epidemiological studies are required to explore where the boundaries between speech and language impairment and autism lie.

Emphasis on better prenatal care in the developing countries would decrease the incidence of MR and other learning and

behaviour disorders.

Limited English proficiency and multilingualism play an important role in the evaluation and intervention of language based disorders. They are thus important factors in the planning of assessment/intervention programs in developing countries with a presence of bilingualism/multilingualism.

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