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## Research Article

### STUDY OF THE ASSOCIATION OF POSTNATAL RISK FACTORS IN CHILDREN WITH LEARNING DISABILITY

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#### ABSTRACT

**Introduction:** Learning disability (LD) is a term that refers to a heterogeneous group of neurobehavioral disorders manifested by significant unexpected, specific and persistent difficulties in the acquisition and use of efficient reading (dyslexia), writing (dysgraphia) or mathematical abilities (dyscalculia). A broad range of factors may affect neurodevelopmental outcome, including postnatal factors like low birth weight, hyaline membrane disease, intraventricular hemorrhage, hypoglycemia, meningitis, hypothyroidism, hyperbilirubinemia and prematurity. **Aims and Objectives:** Percentage of children with LD having association with postnatal risk factors and other co morbid conditions like ADHD and Seizure disorder in these children. **Material and Methods:** Retrospective Case control study, minimum sample size is 120 each of case and control. **Results:** The mean age of children presenting for evaluation of LD and diagnosed as learning disabled was 13.16 years (SD of 1.77 years) and control was 12.87 (SD of 1.69). The male to female ratio in cases was 3.25:1 and among the controls the ratio was 4.46:1. Postnatal risk factors found to have a highly significant (p value <0.01) association in this study were hyperbilirubinemia 20 (16.7%), and hypoglycemia 7 (5.8%). LD cases had associated ADHD and 10 (8.3%) had seizure. **Conclusions:** Postnatal risk factors found to have a highly significant (p value <0.01) association in this study were hyperbilirubinemia 20 (16.7%), and hypoglycemia 7 (5.8%). ADHD and Seizure disorder were found to be associated with LD. Significant association was found between developmental delay and LD cases as compared to controls (p value <0.01).

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#### INTRODUCTION

Learning disability (LD) is a generic term that refers to a heterogeneous group of neurobehavioral disorders manifested by significant unexpected, specific and persistent difficulties in the acquisition and use of efficient reading (dyslexia), writing (dysgraphia) or mathematical abilities (dyscalculia) despite conventional instructions, intact senses, normal intelligence, proper motivation and adequate socio-cultural opportunity. The term LD does not include children who have learning problems which are primarily the result of visual, hearing, motor handicaps, subnormal intelligence, emotional disturbance, or of socio-cultural disadvantage. A broad range of factors may affect neurodevelopmental outcome, including postnatal factors like low birth weight, hyaline membrane disease, intraventricular hemorrhage, hypoglycemia, meningitis, hypothyroidism, hyperbilirubinemia and prematurity. The same postnatal risk factors are associated with other neurobehavioral co morbidities like ADHD which often coexist with LD.

Children with extremely low birth weight without gross physical or intellectual impairments are at higher risk for LD and cognitive deficiencies than their term-born peers and that further efforts are needed to improve identification and treatment of these learning problems. Hence, we decided to evaluate whether a particular postnatal risk factor is associated with a specific type of LD.

##### *Aims and Objectives*

Percentage of children with LD having association with postnatal risk factors and other co morbid conditions like ADHD and Seizure disorder in these children

#### MATERIAL AND METHODS

Retrospective Case control study, minimum sample size calculated is 120 each of case and control. On review of annual register of LD clinic of last 3 year. Children certified as having LD were included as cases and age, sex matched children attending school clinic having no academic issues taken as

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controls. The assessment of children comprising of a detailed questionnaire and clinical examination will be done by the co-investigator under supervision of Principal investigator. The sociodemographic, medical, personal, and family, detailed birth history (including perinatal and postnatal history) as given by mothers and child will be noted; taking help of old case papers when available. Children included in the study must have been diagnosed as learning disabled on the basis of a comprehensive developmental, psycho educational evaluation at the medical centre by a team of experts including pediatricians, psychiatrists, psychologists and occupational therapists (for ADHD). A standard psycho educational battery which includes tests of academic excellence (e.g. Woodcock Johnson test or WRAT) and tests of intelligence (e.g. WISC) may have been performed to aid the diagnosis. The diagnosis of co morbid conditions (ADHD) will be confirmed by the consultant pediatricians and psychiatrists on clinical grounds and with DSM V Criteria. All children will be evaluated for vision and hearing defects. Software SPSS Version 17.0 was used for analysis.

## RESULTS

The mean age of children presenting for evaluation of LD and diagnosed as learning disabled was 13.16 years ( SD of 1.77years) and control was 12.87 (SD of 1.69). The male to female ratio in cases was 3.25:1 and among the controls the ratio was 4.46:1. Postnatal risk factors found to have a highly significant (p value <0.01) association in this study were hyperbilirubinemia 20 (16.7%), and hypoglycemia 7 (5.8%). No significant association could be established between LBW, IVH, HMD, prematurity, hypothyroid and meningitis with LD. 31 (25.8%) LD cases had associated ADHD and 10 (8.3%) had seizure. All 31 cases of LD with ADHD were found to have some or other postnatal risk factors whilst only 4 out of 10 cases of LD with seizure disorder showed the presence of postnatal risk factors compared to control were no risk factor found. Association was found to be statistically significant (p value <0.01).

Out of 120 children with LD, 19 (15.8%) children were found to have delay in achievement of gross motor milestones whilst 14 of them (11.7%) had delayed development of fine motor milestones. In the control group, gross motor developmental delay was observed in 3 out of 120 children (2.5%) and 2 of them (1.7%) revealed a delay in fine motor milestones. This difference was statistically significant (p < 0.01). Delay in speech and language and social milestones was observed in 23 (19.2%) and 15 (12.5%) children with LD respectively whereas only 5 (4.2%) and 2 (1.7%) children in the control group had similar delay in speech and language, and social milestones respectively.

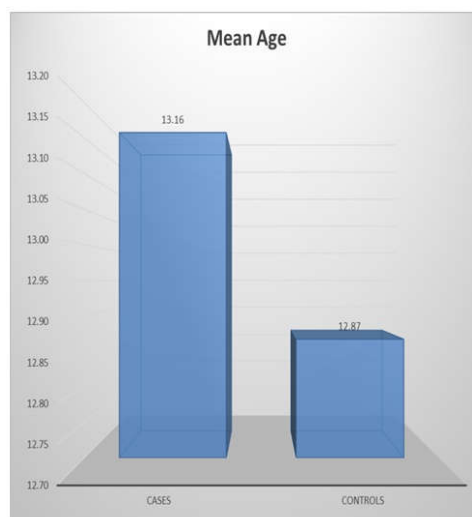


Figure 1 Age distribution in LD cases Vs control

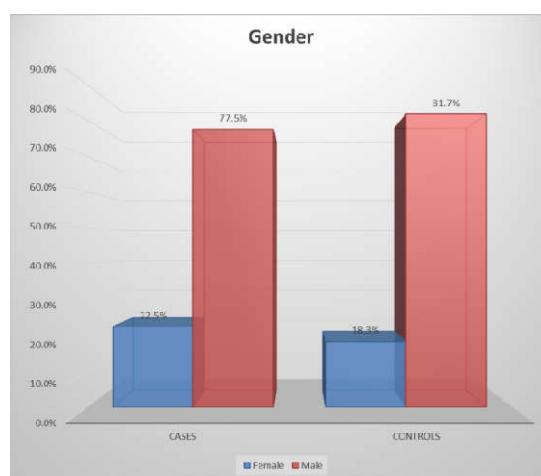
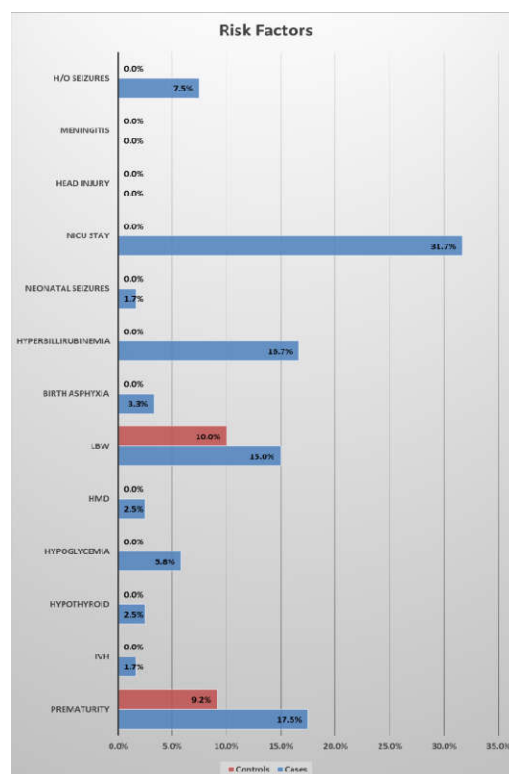
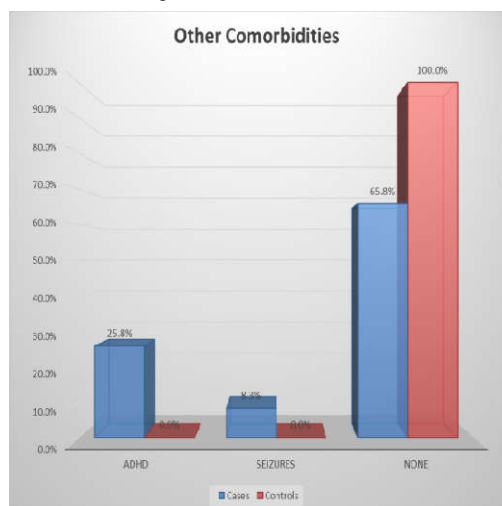


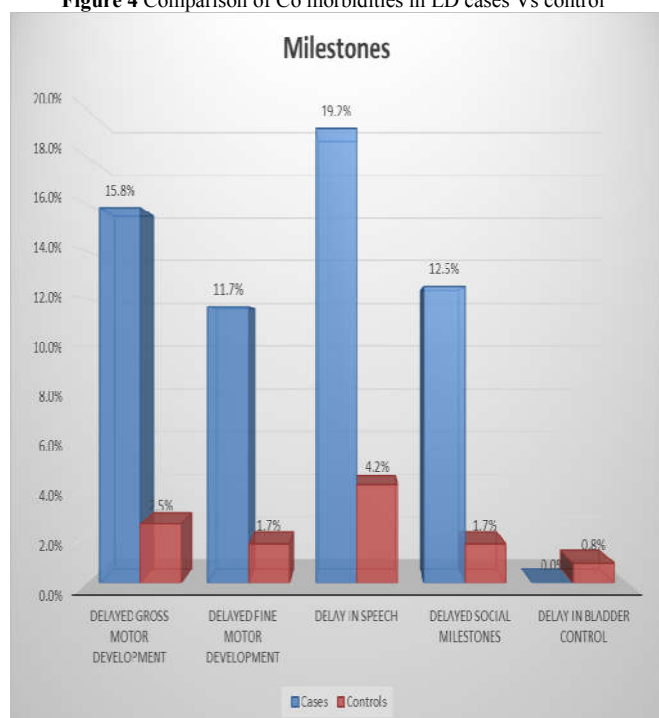
Figure 2 Gender distribution in LD cases Vs control.



**Figure 3** Distribution of postnatal risk factors in LD cases and controls:



**Figure 4** Comparison of Co morbidities in LD cases Vs control



**Figure 5** Comparison of developmental delay in LD cases Vs control

## CONCLUSIONS

The male to female ratio found in this study was 3.25:1. The mean age at diagnosis of LD was 13.16 years. History of NICU stay in LD cases was higher as compared to control group and the difference was highly statistically significant ( $p$  value  $<0.01$ ). Postnatal risk factors found to have a highly significant ( $p$  value  $<0.01$ ) association in this study were hyperbilirubinemia 20 (16.7%), and hypoglycemia 7 (5.8%). where as no significant association could be established between LBW, IVH, HMD, prematurity, hypothyroid and meningitis with LD. ADHD and Seizure disorder were found to be associated with LD. Among these two, ADHD was also found to have a highly significant association with the postnatal risk factors ( $p < 0.01$ ). Significant association was found between developmental delay and LD cases as compared to controls ( $p$  value  $<0.01$ ).

Considering the fact that the cases and controls were siblings, the genetic, environmental, and socio-cultural backgrounds remain similar in both. Owing to this, the development of LD may be attributed to the post-natal risk factors noted in the cases, with which a significant association of LD has been found in our study.

## Limitations

There are a few limitations of this study. In a clinical setup and country like India with its diverse socio-cultural practices, there could have been a referral bias. Further, these data like birth history and developmental history are dependent upon memory of the parents which could lead to memory bias.

Nevertheless, we believe the findings are important since many children in rural part of India don't get evaluated for SpLD. Hence lots of data from India is lacking but the awareness is on the rise. Limited research is available on the association of postnatal risk factors and learning disabilities. The implications of this study need to be determined by future studies.

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