PROBLEM OF DYSLEXIA AMONG YOUNG CHILDREN OF BANGLADESH

The thesis paper submitted in partial fulfillment of the requirement for the degree of Master of Philosophy (M. Phil) in Educational Psychology.

Submitted to:

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<u>Declaration</u>

I, Irfana Samia, M. Phil student of Educational Psychology, Department of Psychology, University of Dhaka, Session:2008-2009, declare that this thesis on **'Problem of Dyslexia among Young Children of Bangladesh'** has been accomplish by myself under the supervision of Dr. Shaheen Islam, Professor and Chairman, Department of Educational and Counseling Psychology, University of Dhaka.

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CERTIFICATION

This is to certify that the thesis entitled **'Problem of Dyslexia among Young Children of Bangladesh'** submitted by Irfana Samia in partial fulfillment of the requirements for the degree of Master of Philosophy (M. Phil) in Educational Psychology, Department of Psychology, University of Dhaka, is an original work it was done under my supervision. I recommend the thesis for Examination.

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Abstract

The present study investigated the nature and problem of dyslexia among young children of Bangladesh. Relation between poor academic performances and being at risk of dyslexia and utility of Dyslexia Early Screening Test, Second Edition (DEST-2) were also investigated. DEST-2 by Nicolson, R. I. and Fawcett A. J. (2004) was taken as a measure for screening at risk level of dyslexia. Purposive sampling technique was used for selecting the participants. Total ninety children aged 4 years 5 months to 6 years 5 months were taken as participants for this study. The study was done into two phases. In the first phase, a pilot study was conducted where thirty children, fifteen from English Medium and fifteen from Bangla medium schools of Dhaka City were taken as primary samples. Besides, twelve judges who worked as teachers and psychologists in Dhaka City, were selected to collect opinion regarding the items of all subtests of DEST-2.In the second phase, sixty children from three different English medium schools located at Dhaka (twenty eight children), Rajshahi (fifteen children) and Chittagong (seventeen children) cities, were selected based on teachers' comments and observation according to their poor academic performances. The opinion of twenty teachers from Dhaka, Rajshahi, Chittagong were taken through a subjective questionnaire developed by the researcher regarding the probable nature and problems of dyslexia among young children of Bangladesh. Findings from the pilot study showed that most of the subtests of DEST-2 would be applicable for the Bangladeshi children except few of the subtests where some changes would be required.Findings from the main study showed that more than half of the participants, who had poor academic performances from each of the locations ,were at risk of dyslexia according to the screening diagnosis through DEST-2.Besides, the findings also reveals the nature and problem of dyslexia in terms of difficulties in phonological processing, reading, writing, spelling, handwriting, working memory, receptive language and fluency in performing tasks.

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Chapter 1: Introduction

1.1   Country Profile:

Bangladesh, on the northern coast of the Bay of Bengal, is surrounded by India, with a small common border with Myanmar in the southeast. With an area of about 144,000 square km, Bangladesh, one of the most crowded nations, with the population about 161,083,804(2012 est.) is the seventh most populous country in the world.   Bangladesh is divided into seven administrative divisions: Barisal, Chittagong, Dhaka, Khulna, Rajshahi, Sylhet and Rangpur. About 42 percent of people in the country living below poverty line, their gross national income (per capita) is $520 US (UNICEF, 2010).Although being a poor country Bangladesh is committed to the rights of basic education for all children which is clearly stated in the constitution. Since its independence, Bangladesh has undertaken many initiatives to improve its education in line with its national development objectives. In this regard, Bangladesh is a signatory country of some important International policy guidelines, such as the Convention on the Rights of the Child (CRC), the Millennium Development Goals (MDG; UN, 2000) and the Education for All (EFA; UNESCO, 2000) which are the key tools for Early Childhood Development. But school dropout is playing a critical role and creating obstacles to achieve Universal Primary Education (UPE) for ECD in Bangladesh which is one of the major concerns of EFA and MDG.

It is mentioned that early childhood years refers to conception through eight years of age and Early childhood development (ECD) refers the development of health, learning and behavior from the prenatal period through the transition to primary schooling (Britto, Yoshikawa and Boller, 2011).Early learning and education is one of the important features of ECD. In addition, ECD services or programs refer to the broad range of supports for young children and families.

These can cover areas of health, early learning and education, family support, and attention to social protection (e.g., poverty reduction) and child welfare (Britto et al. 2011).

In Bangladesh although entry into Grade 1 has reached near universal levels but the primary school completion rate has remained around 60 percent since 2000 (World Bank, 2009). High repetition and drop out remain substantial problems as these are two barriers to universalizing access to primary education in Bangladesh. The levels of these two indicators are the main reasons behind Bangladesh being 'off-track' to achieve the completion of universal primary education by 2021 (National Audit Office, 2010). A document produced by the Bangladesh government shows a 55 percent survival rate to the final grade of elementary school in 2008 (53 percent boys and 57 percent girls), which means that 45 percent of children who enter in Grade 1 are likely to drop out without completing primary school (GoB, 2009). Government information shows the dropout rates at primary level have been falling slowly, from around 60 percent in 1991 to 48 percent in 2004.Therefore, the decline is far too slow to allow universal completion by 2015. In many cases, children enter school but remain 'silently excluded' (Lewin 2007), which means that they have poor attendance records and very low school performance.

Disabilities are another important factor that may contribute to school dropout along with the other factors like child labor and poverty, poor health, nutrition and lack of motivation of children and poor quality of educational provision (Sabates, Hossain & Lewin, 2010). Major issue with disability is that many children in low income countries who suffer from a physical or psychological impediment are denied access to education (Peters, 2003). In Bangladesh, for example, children with disabilities are less likely to start school and if they do, their overall school attainment and possibilities for transition into lower secondary schooling remain very low

(Filmer, 2005). In this perspective, dyslexia as a specific learning disability may be a probable factor in school dropout and poor academic performance in Bangladesh.

1.2   General overview of the topic:

Many children experiencing difficulties at schools of Bangladesh do not have their problems identified until they start to fail in examination or even after dropout from the education process. Some children are labeled as lazy or slow learner or late developers as their academic performances are very poor rather assessing or diagnosing the developmental or educational needs of the child as early as possible. In certain cases, reasons behind the poor academic performances and dropout are unknown to the parents, teachers and educators. From the country profile of Bangladesh described above, it was seen that dyslexia or specific learning disability may play a crucial role behind the early dropout and poor academic performances in school. But there are no appropriate or standardized tools to identify the true nature and problem of dyslexia among the young children and adults in Bangladesh. At the same time, dyslexia is a very new concept for the population of Bangladesh. There is not much research work in Bangladesh on this topic. But lots of research works had been done at abroad on dyslexia. Those studies also showed that Dyslexia might be a very vital issue to hinder children's learning if proper assessment and early intervention are not taken. Therefore, the present study was being designed in the light of the Dyslexia Early Screening Test, Second Edition (DEST-2) to initiate work on dyslexia specially in identifying this difficulty and to explore the problem of dyslexia among the young children of Bangladesh.

1.2.1   What is Dyslexia?

Dyslexia has been around for a long time and has been defined in different ways.Following considerable debate in the 1970s and 80s (Pumfrey & Reason, 1991), when many practitioners expressed serious reservations about the concept 'Dyslexia', education in the UK opted for the term 'Specific Learning Difficulties' while similar developments in the US resulted in 'learning disabilities' or 'specific learning disability'. With the continued use of 'dyslexia' in cognitive research and in psycho-medical practice, the Code of Practice (Department for Education and Employment, UK, 1994) subsequently chose the compromise phrase 'specific learning difficulties'.

1.2.2   Meaning of the word 'Dyslexia':

The term dyslexia is derived from two Greek words-'dys' meaning 'difficulty' and 'lexis' meaning 'words'. The literal meaning of dyslexia is thus 'difficulty with words' which may be extrapolated to 'difficulty with reading and spelling words. The term was first coined in 1887 by Rudolf Belin in Germany and was used to describe the inability to read. Nine years later Dr. Pringle Morgan described the condition in the British Medical Journal, as it is more or less accepted today, as an inability to read occurring in an otherwise bright and developmentally normal child.

1.2.3   Definition of Dyslexia by Dr. Gavin Reid:

Dr. Gavin Reid, Consultant on Learning Disabilities and an Educational Psychologist gave the following definition in his book 'Dyslexia: A Practitioner's Handbook (2009, pp-4):

'Dyslexia is a processing difference, often characterized by difficulties in literacy acquisition affecting reading, writing and spelling. It can also have an impact on cognitive processes such as memory, speed of processing, time management, co-ordination and automaticity. There may be visual and/or phonological difficulties and there are some discrepancies in educational performances. There will be individual differences and individual variation and it is therefore important to consider the learning style and the learning and work context when planning intervention and accommodations.'

1.2.4   Working Definition of Dyslexia:

The working party report on Dyslexia, Literacy and Psychological Assessment in the U.K. opted for a working definition of dyslexia because they felt that a working definition did not require any causal explanation. The working definition they opted for was:

'Dyslexia is evident when accurate and fluent word reading and/or spelling develops very incompletely or with great difficulty. This focuses on literacy learning at the 'word level' and implies that the problem is severe and persistent despite appropriate learning opportunities. It provides the basis for a staged process of assessment through teaching' (British Psychological Society, 1999).

1.2.5   Definition of Dyslexia by the International Dyslexia Association (IDA):

'Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading

comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge' (IDA, 2002).This definition is also used by the National Institutes of Child Health and Human Development   (NICHD, 2002).

1.2.6 Definition of Dyslexia by British Dyslexia Association (BDA):

Dyslexia is a specific learning difficulty that mainly affects the development of literacy and language related skills. It is likely to be present at birth and to be life-long in its effects. It is characterized by difficulties with phonological processing, rapid naming, working memory, processing speed, and the automatic development of skills that may not match up to an individual's other cognitive abilities. It tends to be resistant to conventional teaching methods, but its effect can be mitigated by appropriately specific intervention, including the application of information technology and supportive counseling (BDA, 2007).

1.2.7   Sir Jim Rose's Report:

In 2009 Sir Jim Rose's Report on 'Identifying and Teaching Children and Young People with Dyslexia and Literacy Difficulties' gave the following description of dyslexia, which was adopted by the BDA Management Board, but with the addition of the further paragraph shown below, which should always appear with it:

Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling; ii) Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and verbal processing speed; iii) Dyslexia occurs across the range of intellectual abilities; iv) It is best thought of as a continuum, not a distinct category, and there are no clear cut-off points; v) Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organization, but these are not, by

themselves, markers of dyslexia; vi)A good indication of the severity and persistence of dyslexic difficulties can be gained by examining how the individual responds or has responded to well founded intervention.

In addition to the above characteristics, the BDA acknowledges the visual and auditory processing difficulties that some individuals with dyslexia can experience, and points out that dyslexic reader can show a combination of abilities and difficulties that affect the learning process. Some also have strengths in other areas, such as design, problem solving, creative skills, interactive skills and oral skills (British Dyslexia Association, 2009).

1.2.8 IQ and Dyslexia

Dyslexia can occur across a range of intellectual abilities. Poor achievement despite average or better intelligence can be considered a key indicator. US regulations on dyslexia summarized the findings in this regard from many studies that intelligence is not the best predictor of how easily a student will develop written language (reading and spelling) skills. Instead, oral language abilities (listening and speaking) are considered the best predictors of reading and spelling (IDA, 2010).

From the above definitions and nature of Dyslexia described by different experts and institutions, it can be seen that dyslexia is a specific learning difficulty which is expressed through difficulty with reading and spelling words. As reading and spelling are two most vital tools for learning, children with dyslexia might be frustrated about school reading and testing. Not only that, this difficulty hampers their academic performances. As a result, they may manifest poor self concept and low self-esteem, signs of depression, emotional and behavioral problems at home and school. They might be labeled as lazy, dump, careless and un-smart by

people around them. Gradually they may become de-motivated and develop a disliking for schools. Ultimately, they dropout from the schools. Early identification and intervention of dyslexia may be a step to help young children to overcome the problems created by the learning difficulties at their personal and social levels and obviously that is required for early childhood development. But there are no appropriate tools for identifying dyslexia among the Bangladeshi children. That's why the parents and professionals are unaware and confused about the nature and problem of dyslexia among our children.

The present study was designed to take a step for early screening of dyslexia among the young children of Bangladesh. Therefore, Dyslexia Early Screening Test, Second Edition (DEST-2) was used to find out the at risk level of dyslexia among the participants.

In fact, Dyslexia Early Screening Test (DEST) were designed to pick out children, who are 'at risk' of reading failure, early enough to give extra support at school. The DEST-2 was intended as a screening instrument for use routinely within a school for children aged 4 years 6 months to 6 years 5 months. It forms a valuable first step in deciding whether to request further full assessment by educational psychologists. It also provides a profile of strengths and weaknesses which can be used to guide the development of in-school support for the child and can form the basis for important records of the child's development (DEST-2 Manual, 2004).

1.3.   Literature Review

There are differences within the groups of professional practitioners and researchers regarding the viewpoint of dyslexia. Fawcett (2008) suggests that one of the major tensions in dyslexia research is the range of potentially conflicting viewpoints. Because of the complexities and the significant number of studies focusing on different aspects of dyslexia, there are some

frameworks for understanding and discussing Dyslexia. Those frameworks are described under the subheadings 1.3.2 to 1.3.3 shown below:

1.3.1 Causal Modelling Framework

According to Firth a causal modeling framework which involves three levels of description-behavioral, cognitive and biological may clarify some of the issues relating to the concept of dyslexia. Firth (2002) suggests that Dyslexia is a neuro-developmental disorder with a 'biological origin and behavioral signs which extends far beyond problems with written languages (p.45). But from Firth's research it was also found that this framework should be seen as being fluid and flexible and incorporating overlapping dimensions. For example, neurological, cognitive and educational dimensions can be influenced by the phonological processing.

1.3.2 Genetic Factors:

There have been considerable efforts to identify the genetic basis for dyslexia. The risk of a son being dyslexic if he has a dyslexic father is about 40% (Gilger, Pennnington and DeFries,1991). Much of this work has been focused on the heritability of reading sub-skills and particularly the phonological component. Gilger suggested about some genetic regions which can be responsible for different aspects of reading and writing process such as: reading and verbal ability, single word reading, spelling, phoneme awareness, phonological decoding, pseudo as well as non-word reading and writing, IQ, language skills, rapid naming and verbal short term memory. Nevertheless, there was strong evidence that genes do have impact on Dyslexia\ and there will be children who are 'genetically at risk' of dyslexia (Gilger, 2008). This point is important as it can provide pointers for early identification.

Many of the gene studies do indicate the presence of a possible site for 'dyslexic genes'; many of those found in Chromosome 6.A new candidate gene for Specific Language Impairment has been identified by a research team directed by Mabel Rice at the University of Kansas, in collaboration with Shelley Smith, University of Nebraska Medical Center, and Javier Gayán of Neocodex, Seville, Spain (2009).The finding was discovered by examining genes previously identified as candidate genes for reading impairments or speech sound disorders. The results pointed toward the likelihood of multiple genes contributing to language impairment, some of which also contribute to reading or speech impairment. A gene on Chromosome 6 – KIAA0319 was associated with variability in language abilities in a study of children with Specific Language Impairment (SLI) and their family members, as well as with variability in speech and reading abilities. Children with SLI who were selected for the study had no hearing loss, general intellectual deficit or autism. Language ability involves vocabulary and grammar, whereas speech involves the accuracy of sound production. Both language and speech ability contribute to a child's ability to read. The finding was that a candidate gene could influence all three abilities.

In a longitudinal study Gallagher, Frith and Snowling (2000) found at age six more than half of the at risk group scored below average compared to a control group on literacy tasks. Clearly therefore genetic factors are associated with dyslexia and this of course can lead to early identification or at least some very early warning signs of a child being at risk of being dyslexic. Castles, Datta, Gayan and Olson (1999) found a strong heritability element among 'phonological dyslexics' and Olson, Forsberg, Wise and Rack (1994) found also a strong heritability component both for phonological decoding and orthographic skills. Familial risk is therefore a strong indicator of dyslexia and supported by prevalence studies (Molfese et al., 2008)

1.3.3 Neurobiological Factors:

The advance in magnatic resonance imaging and other forms of brain imagery such as positron emission tomography (PET) are increasingly being used to observe the active processes within the brain as well as brain structure. These have been great benefit to neuroscientists investigating factors relating to dyslexia. From these studies a number of different factors have emerged focusing on structural and functional brain related factors. Some of those are discussed below.

Visual and Temporal Processing:

Visual stress can interfere with the ability to read. It can also affect the development of fluent decoding of text and good reading comprehension. If visual stress is not identified and dealt with early on, children are at risk of remaining unskilled readers, particularly when trying to understand longer and complex texts. It is mentioned that most widely supported theory of visual stress is that it is the result of a general over-excitation of visual cortex due to hypersensitivity to contrast or pattern glare (Singleton ,2009).

Whiteley and Smith (2001) estimated the prevalence of visual stress in dyslexics to be in the region of 50%.Using ViSS, a computer based screening tool for visual stress, Singleton and Henderson (2007) found that 41% of dyslexic children in their sample showed high susceptibility to visual stress; the corresponding figure for the non-dyslexic control group was 23%.These finding raised an important issue on the relationships between dyslexia and visual stress.

Magnocellolar Visual System:

Singleton (2009) suggested that the research on Magnocellular visual system can also be related to visual stress. There are two types of cells found in the neural tracts between the retina and the visual cortex: *magnocells* are large cells that code information about contrast and movement; *parvocells* are smallers and code information about detail and color. Cooperation between these two systems enables us to perceive a stationary image when we move our eyes across a scene or a page of text.

Stein (2008) provides evidence that the development of magnocellular neurons is impaired in children with dyslexia. He argues that the visual system provides the main input to both the lexical and sublexical routes for reading and therefore, vision should be seen as the most important sense for reading.Stein showed that there are two main kinds of ganglion cell,whose axons project all the visual information back to the brain.10% of these are known as magnocellular cells because they are noticeably larger than the others and covers a 50 times greater area that those of the much more numerous but much smaller, parvocells. He therefore suggested that the great variety of visual, phonological, kinaesthetic, sequencing, memory and motor symptoms that are seen in dyslexics may arise from differences in the particular magnocellular systems that are most affected by the particular mix that each individual dyslexic inherits.

Procedural Timing:

According to Fawcett and Nicolson (2008),there is extensive evidence that the cerebellum is a brain structure particularly susceptible to insult in the case of premature birth and such insult can

lead to a range of motor, language and cognitive problems subsequently. The cerebellar deficit hypothesis may provide a single coherent explanation of the three criterial difficulties in Dyslexia-reading, writing and spelling.Cerebellar deficit hypothesis provide an explanation for the overlapping factors between dyslexia and other developmental disorders (Fawcett and Nicolson, 2008). Dyslexia is indeed associated with cerebellar impairment in about 80% of cases according to the findings of the research 'Developmental Dyslexia: The Cerebellar Deficit Hypothesis' (Fawcett and Nicolson,2011).

One of the functions of the cerebellum is in the precise timing of procedures (e.g. several motor movements) .This timing of sequences may play a critical role in making task accomplishment or behavioral skills automatic. This means that the skill can be carried out without the individual giving it too much thought-and resources can be used to undertake other behaviors or processes simultaneously. For most adults and children, the ability to walk, talk and possibly read and write may be particularly or completely automatic. Fawcett and Nicolson (2008) put forward the hypothesis that dyslexic children would have difficulty in automatising any skill (cognitive or motor).They suggest that reading is subject to automaticity , and since all dyslexia hypothesis predict poor reading as a factor in dyslexia then the automatisation deficit hypothesis would be valid in relation to dyslexia.

Hemispheric Symmetry:

A key early researcher in dyslexia was Samuel T. Orton, a neurologist who worked primarily with stroke victims. In 1925 Orton met a boy who could not read and who exhibited symptoms similar to stroke victims who had lost the ability to read. Orton began studying reading difficulties and determined that there was a syndrome unrelated to brain damage that made

learning to read difficult. Orton called the condition strephosymbolia (meaning 'twisted signs') to describe his theory that individuals with dyslexia had difficulty associating the visual forms of words with their spoken forms. It was seen that that reading deficits in dyslexia did not seem to stem from strictly visual deficits and the condition was caused by the failure to establish hemispheric dominance in the brain.

According to Geschwind and Galaburda (1985), the difficulties in processing information shown by the people of Dyslexia are due to structural differences between the hemispheres,and this likely develops in the prenatal period. This view has received considerable support from subsequent studies.Knight and Hynd (2002) are of the opinion that the principal findings to emerge from these studies suggest that misplaced cells may be present in some areas of the brain, particularly the outer layer of cortex which is usually cell-free.According to Galaburda and Rosen(2001),these misplaced cells can be found predominantly in the left hemisphere in areas associated with language .They also note differences in the primary visual and auditory cortex, where differences in neurons and patterns of cellular symmetry can also be noted. This, they suggest, could provide a neural explanation for some of the visual, auditory, sensory and perceptual difficulties that some researchers ,such as Fitch et al.(1997) and Zeffiro and Eden (2000),propose are associated with Dyslexia.

Phonological Processing, Phonological Awareness and Multisensory programs:

Dyslexia can manifest itself in many ways there may be a single cause -a phonological deficit which was termed as the 'proximal cause of dyslexia' (Snowling,2000).It is important therefore that teachers obtain a practical working plan and to obtain some theoretical background to allow them to understand the nature of dyslexia and its associated difficulties and how these may

influence actual classroom approaches.

Successful early reading and spelling acquisition depends on a number of different skills. Of considerable importance is phonological processing, which is the processing of acoustic signals with linguistic content. Three areas of phonological processing have been found to be most important for reading and writing competence: phonological awareness, naming speed, and phonological working memory. Research on these components suggests that specific interventions tailored to individual phonological processing deficits may prevent later dyslexia. Therefore, it appears mandatory that ear-nose-throat physicians have at least a basic knowledge of the theory of phonological processing. This will enable proper consultation with parents of affected children (Ptok M., Berendes K., Gottal S., Grabherr B., Schneeberg J., Wittler M.,2007).

Using the comprehensive Test of Phonological Processes (Wagner, Torgesen, & Rashotte, 1999), the researchers Park J. & Lombardino L. J. (2012) compared strengths and weaknesses in phonological processing skills in three groups of children with mild to moderate sensorineural hearing loss (MSNH group),children with dyslexia, and age-matched controls. Children with dyslexia showed deficits in all three phonological constructs.

A systematic meta-analytic review of the relationships among three of the most widely studied measures of children's phonological skills (phonemic awareness, rime awareness, and verbal short-term memory) and children's word reading skills was seen. The review included both extreme group studies and correlational studies with unselected samples. Results from extreme group comparisons indicated that children with dyslexia show a large deficit on phonemic awareness in relation to typically developing children of the same age and children matched on reading level (Melby-Lervag,Lyster,Hulme,2012)

Morphological Processing:

Deacon et al. (2008) argue that there is extensive evidence of morphological difficulties in dyslexic readers. They provide evidence from Leikin and Zur Hagit (2006) who argued that this interpretation is implicit in the research demonstrating two findings : a deficit in morphological awareness in dyslexics and a contribution to reading that is independent of phonological awareness. Yet they indicate that few, if any, researchers would explicitly argue that poor morphological awareness is a causal factor in the development of dyslexia. The probable line is that phonological difficulties are the primary deficit and these in turn cause morphological and reading problems. Deacon also argue that one possibility is that dyslexic have difficulties in morphological awareness due to general language delays since morphology is considered to be a sensitive indicator of language ability. Based on this point the vast majority of current views indicate that morphological processing weakness is secondary to primary deficits in some other domains (e.g. general language skills and phonological processing).

Glue Ear:

Peer (2005,2009) has developed a strong argument to emphasizing the need to acknowledge glue ear syndrome as an influential causal factor in dyslexia. Hearing loss during the first two years of life may result in a delay in emerging receptive and expressive language or both (Friel-Palti and Finitzo,1990). Gravel and Wallace (1995) maintain that although communication skills may appear normal for this group of children on entry to school, other auditory based deficits may emerge in the classroom situation. They suggest that there are weaknesses associated with listening comprehension, academic achievement and even attention and behavioral difficulties. Peer argues that 'glue ear' is ongoing condition for large number of children, meaning that they

experience significant hearing loss over a lengthy period of time. This may also lead to a lack of concentration as well as an inability to process the fine sounds that are necessary for auditory perception and speed of processing which is a major key to language learning.

Cognitive skills:

Dyslexia is a essentially a difference in processing information and cognitive factors such as memory and speed of processing difficulties are important at both the cognitive and the education level. These can involve phonological processing as noted above, memory, processing speed and other factors relating to learning. The 'double deficit' hypothesis indicates that dyslexic people can have difficulties with both phonological processing and naming speed (Wolf,1996; Wolf and Brien, 2001). It is interesting that speeds of processing and semantic fluency are included in some of the popular tests for dyslexic children. Badian (1997) shows evidence for a triple deficit hypothesis, implying that orthographic factors involving visual skills should also be considered.

Metacognition:

The role of metacognotion in learning is also of great importance as this relates to the learner's awareness of thinking and learning and have considerable implications for how we understand the needs of children with dyslexia (Burden,2002;Reid,2001b).Tunmer and Chapman (1996) have shown how dyslexic children have poor meta-cognitive awareness and how this leads them to adopt inappropriate learning behaviors in reading and spelling.

The above past studies gives holistic ideas about the reason of dyslexia i.e. lacking or weakness or impairment in areas mentioned above indicate further problems in learning. Even the

screening tests also screen out the strengths or weaknesses of certain areas. Causal factors covers a broad areas of research on dyslexia or specific learning disability.

1.3.4   Research on Diagnosis of dyslexia:

The Dyslexia early screening test (DEST) was designed to pick out children who are at risk of reading failure early enough to allow them to be given extra support at school. The DEST has been used in over 3000 schools in UK and Internationally. It is particularly gratifying to note that further policy had been made in UK educational policy and provision since the initial publication of DEST. The UK is the only country that had standardized early screening teat available till 2004.From 2002 onwards, early identification had been advocated for school children legally in UK. The Dyslexia early screening test, second edition (DEST-2) was designed to reflect changes in theory and practice since its initial publication in 1996.The DEST-2 was intended as a screening instrument for use routinely within a school in UK for children 4.5 years to 6.5 years. It provides a profile of strengths ans weaknesses which can be used to guide the development of in school support for the child (Nicolson & Fawcett, 2004).In the present study, DEST-2 was used as instrument for screening at risk level of dyslexia among young children of Bangladesh.

In Ontario, Canada, there is a demand for psychometrically robust screening tools capable of efficiently identifying students with specific learning disabilities (SLD), such as dyslexia. Harrison, A. G. and Nichols, Eva(2005) investigated the ability of the Dyslexia Adult Screening Test (DAST) to discriminate between 117 post-secondary students with carefully diagnosed SLDs and 121 comparison students in the study 'A Validation of the Dyslexia Adult Screening Test (DAST) in a Post-Secondary Population'. Results indicated that the DAST correctly identified only 74% of the students with SLDs as "highly at risk" for Dyslexia. Although

employing the cutoff for "mildly at risk" correctly identified 85% of the students with SLDs, this also increased the percentage of students with no major history of learning problems identified as "at risk" for Dyslexia from 16% to 26%. These findings suggested that the DAST in its present form was limited in its ability to screen for SLDs.

In a previous study Fawcett, Nicolson, & Dean (1996) found strong behavioral evidence for cerebellar deficit in a panel of children with dyslexia. The generality of those results was assessed in that study. A battery of clinical tests for cerebellar dysfunction was administered, together with selected cognitive tests, to a further 59 dyslexic and 67 control children. Findings suggested highly significant impairments in dyslexic children on the cerebellar tests, with deficits on postural stability and muscle tone comparable in magnitude with their reading and spelling deficits.

1.3.5   Prevalence studies of Dyslexia:

A study was conducted in a South Indian city to measure the prevalence of specific learning disabilities (SpLDs) such as dyslexia, dysgraphia and dyscalculia among primary school children (Mogasale & Mogasale ; Patil   &Patil, 2013). A cross-sectional multi-staged stratified randomized cluster sampling study was conducted among children aged 8-11 years from third and fourth standard. A six level screening approach that commenced with identification of scholastic backwardness followed by stepwise exclusion of impaired vision and hearing, chronic medical conditions and subnormal intelligence was carried out among those children. In the final step, the remaining children were subjected to specific tests for reading, comprehension, writing and mathematical calculation. The prevalence of specific learning disabilities was 15.17% in sampled children, whereas 12.5%, 11.2% and 10.5% had dysgraphia, dyslexia and dyscalculia

respectively. This study suggests that the prevalence of SpLDs is at the higher side of previous estimations in India. The authors expressed the need for more prevalence studies, remedial education and policy interventions to manage SpLDs at main stream educational system to improve the school performance in Indian children.

1.3.6   Research showing the relationship between Poor School Performance and Dyslexia:

In our neighbor country India, a research work was done on the etiology of poor school performance in children (Karande, Doshi, Thadhani and Sholapurwala, 2013). Children were being assessed at a learning disability clinic in western India over 12 months. The researchers found Specific learning disabilities (dyslexia, dysgraphia and dyscalculia) as the commonest cause of poor school performance (72.76%), followed by borderline intellectual functioning (8.94%), language barrier (8.54%), and mental retardation (4.88%).

1.3.7   Research on Dyslexia in Bangladesh:

The first attempt in Bangladesh to work in the area of Dyslexia was taken by Haque and Anwar (2007), Department of Psychology, University of Dhaka, in their unpublished research work on "Diagnosing Dyslexia among Young Children". They took 15 children from English medium schools within the age range of 4yrs 6 month to 6 yrs 5 months. No children were identified as dyslexic by using Dyslexia Early Screening Test, Second Edition (DEST-2).

Later on Haque and Samia (2008), Department of Psychology, University of Dhaka, worked on 'Piloting DEST-2 to Identify Dyslexia among Young Children'. Twenty children were selected for this study. Convenient sampling technique was used for selecting the respondents. Half of them were taken from English medium and other half were from Bengali medium schools from Old Dhaka City. The participants were from 4 years 5 months to 6 years 5 months of age. DEST-

2 by Nicolson, R.I. and Fawcett A.J. (2004) was taken as a measure for identifying dyslexia in the present research. The results showed that most of the children acquired strongly at risk indicator or at risk indicator i.e. below normal score in two subtests viz. Rhyme/First Letter and Vocabulary. The Researchers faced challenges while administering these subtests which need to be adapted according to Bangladeshi culture. Also, three children were found strongly at risk of dyslexia. Among them two children were from Bengali medium schools and one was from English medium school. Early diagnosis will help the children who have strongly at risk of dyslexia to take necessary intervention to overcome their problems.

1.4   Rationale

Dyslexia has been, and continues to be, the focus and stimulus for considerable research activity and debate within the disciplines of Psychology, education and medicine now a day. But it's almost a new term to the general people of Bangladesh. At abroad there are much works on this issue specially regarding its etiology, diagnosis and intervention. But Bangladesh is far behind compared to other countries in exploring the nature of dyslexia, ensuring proper diagnosis and providing intervention. Even our neighbor country India is doing much progressive research works in this area to implement the findings for improving the learning experience of their children. Because in India, specific learning disabilities are recognized as one of the important causes for poor school performances (Mogasale & Mogasale, Patil & Patil, 2011).In many cases the reasons for the poor academic performances, failure in the examinations and dropouts from schools of a great number of students in Bangladesh remain unknown to most of the parents, teachers,educators and professionals. From the past research work done at abroad, it was seen that dyslexia or specific learning disability might have an impact on the learning of children which causes poor academic performances and dropout from school. But there are no appropriate

or standardized tools to measure dyslexia or even the at risk level of dyslexia among young children of Bangladesh. Besides, research showed that the earlier children with potential reading difficulties can be identified, the easier it is to overcome their reading problems (Fawcett & Nicolson, 2004). Therefore, this study would be a valuable step in Bangladesh to have an idea about a screening tool of dyslexia which can lead the further step to develop a tool to measure the risk level of dyslexia; to see whether there is any impact of dyslexia or specific learning disability behind poor academic performances among the young children of Bangladesh. Also, the nature of dyslexia may be not common to most of the parents, teachers, professionals and educators of Bangladesh. May be their children, students and relatives are facing the problem of dyslexia but they are unable to identify exactly what it is. So, it is essential to diagnose the true nature of this problem to create awareness over this issue so that early and appropriate intervention and support can be given to the young children for ensuring early childhood development.

1.5   Objectives:

1. Piloting to see the utility of Dyslexia Early Screening Test, Second Edition (DEST-2).

2. To determine the probable nature and problem of dyslexia among young children of Bangladesh.

3. To see whether there is any relation between poor academic performances and being at risk of dyslexia.

Chapter 2: Methodology

2.1 Participants

Total ninety children aged 4.5 years to 6.5 years were taken as participants for this study. The study was done into two phases. In the first phase, a pilot study was conducted where thirty children, fifteen from English Medium and fifteen from Bangla medium schools of Dhaka City were taken as primary samples. Besides, twelve judges, who worked as teachers and psychologists in Dhaka City, were selected purposively to collect opinion regarding the items of all subtests of DEST-2.In the second phase, sixty children were taken based on their poor academic performances from three different English medium schools located at Dhaka, Rajshahi and Chittagong cities of the respective Divisions which were selected purposively to represent the sample from Bangladesh. The number of the participants from the schools of Dhaka, Rajshahi and Chittagong were twenty eight, fifteen and seventeen respectively. Besides, twenty teachers' (seven from the schools of Dhaka,seven from Rajshahi and six from Chittagong) opinion were taken regarding the probable nature and problems of dyslexia among the young children of Bangladesh.
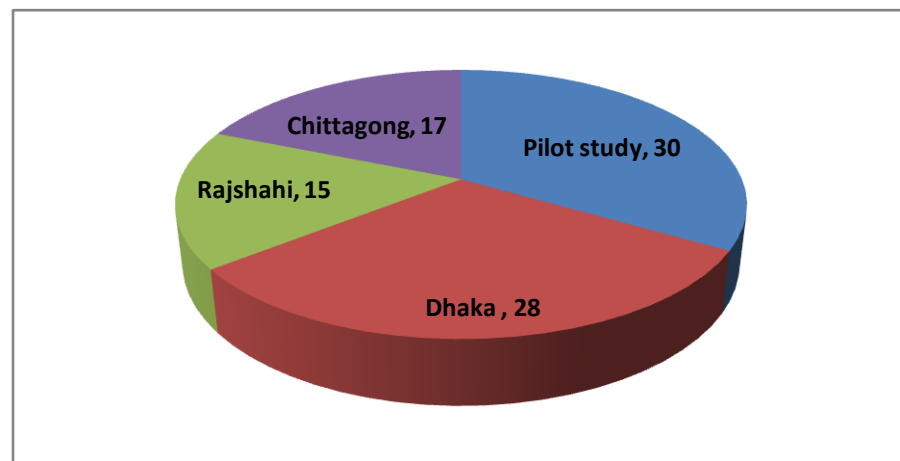
Figure 1: Number of Participants of pilot study and main study

Table 1: Demographic information of the participants of pilot and main studies

Study Phase	Location	Total No. of Participants	No. of participants in terms of medium of school		No. of participants in terms of gender		Mean age of the participants (in months)	Mean monthly income (in taka) of the parents
			English	Bangla	Male	Female		
Pilot Study	Dhaka	30	15	15	16	14	65.93	102066
Main Study	Dhaka	28	28	0	17	11	72.93	180357
	Rajshahi	17	15	0	9	6	70.60	68333
	Chittagong	15	17	0	8	9	73.00	124705
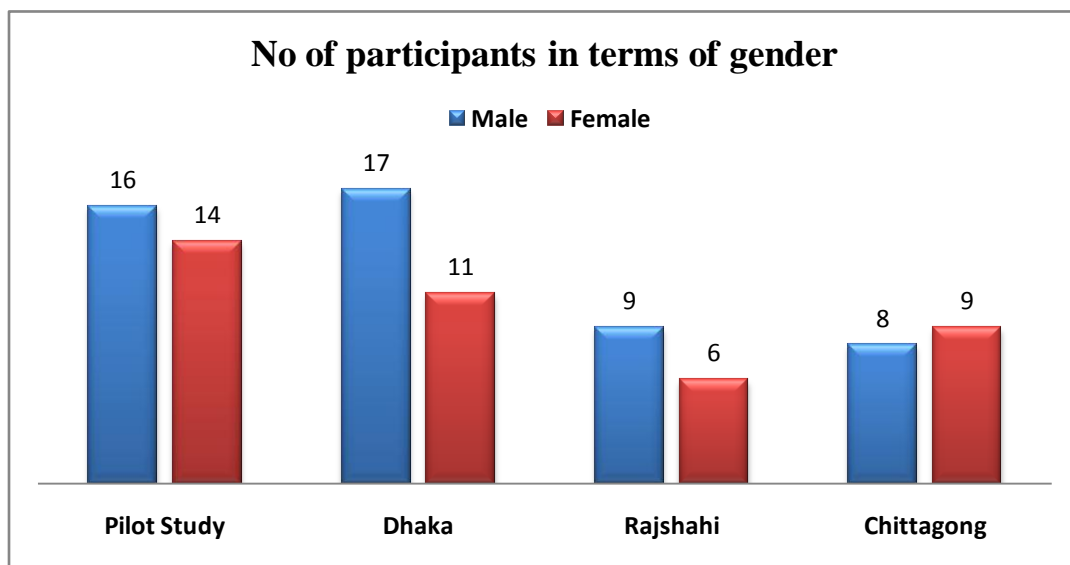
Figure 2: Number of participants of pilot study and main study conducted at Dhaka, Rajshahi and Chittagong in terms of Gender

Table 2: Location and Name of the English medium schools of the main study

Location	Name of the school	Grades of the participants
Dhaka City	Scholastica School, Junior Section, Uttara	KG-I,KG-II
Rajshahi City	North Point English Medium School	Senior Play Group, Nursery
Chittagong City	Independent School & College	Nursery, KG

2.2 Instrument

The Dyslexia Early Screening Test-Second Edition (DEST-2) ,published by Nicolson, R. I. and Fawcett, A. J. (2004) ,was used in this study for identifying Dyslexia among children of 4 yrs 6 months to 6 yrs 5 months. Besides, a subjective questionnaire (attached in appendices) developed by the researcher was used to measure the awareness level of teachers about dyslexia and also to know the probable nature and problem of dyslexia among young children of Bangladesh. DEST-2 had been designed to reflect changes in theory and practice since its initial publication in 1996. There are 12 sub-tests of DEST-2 which are described briefly in the following Table (DEST-2 Manual, 2004):

Table 3: Brief Description of the subtests of DEST-2

Test	Name	Reasons to administer the subtest	Task
1	Rapid Naming	There is evidence that children likely to have reading difficulties are slower at naming familiar	This is tested here by getting them to name a series of outline picture on a card and

		pictures (Wolf's Double Deficit Hypothesis).	time is measured.
2	Bead Threading	Dyslexic children often show a mild degree of clumsiness. This test assesses hand –eye co-ordination and manipulative skill.	Children are required to put beads into a string in a given time (30s).
3	Phonological Discrimination	Slow learners and dyslexic children have difficulties in phonological skill-analyzing speech into the constituent sounds.	Children are asked to tell whether or not two similar sounding words differ.
4	Postural Stability	Dyslexic children show difficulties consistent with slight abnormalities in the cerebellum which is closely involved in motor skill, control of eye movements. This test is based on clinical procedures for establishing cerebella abnormalities.	Children are pushed in their back with three fingers of the examiner with a force of 1.5kg while the child stand up straight keeping hands by sides and in front.
5	Rhyme/First Letter	Dyslexic children are delayed in acquiring the ability to detect rhymes, and this is thought to be one cause of their difficulty in learning to read.	The tester tells two words and the child is asked to tell whether those words make rhyme or not. Also he is asked to detect the first sound of some given words.

6	Forward Disit Span	Digit span is the maximum number of digits a child can remember in the right order. It is an index of working memory. Poor working memory is one of the classic signs of dyslexia.	A sequence of single digits is presented through a tape recorder and the child has to tell them back in sequence.
7	Digit Naming	This test is straightforward tests of pre-reading knowledge. Lack of knowledge correlates with later reading difficulties.	The digits are presented in a card and the child is asked to tell the name of each number.
8	Letter Naming	This is another straightforward test of knowledge. Confusion between 'b' and 'd' is a classic sign of dyslexia.	The letters are presented in a card and the child is asked to tell the name of each letter.
9	Sound order	Children with dyslexia and language disability, have unusual difficulties in deciding the order of two tones presented close together. These difficulties may affect the ability to detect rapid consonant changes, and may make it difficult to hear the sounds in words.	This test involves listening to a cassette tape and saying which of the two sound presented first, for a sequence of presentations. In order to simplify the task for this age group; A squeak supposedly made by a mouse, and a quack for duck.

10	Shape Copying	Dyslexia children usually have difficulty in writing fast and neatly for having poor pencil control. These results difficulties in copying outline shapes.	This test assesses the quality of pencil control while the child is copying simple geometrical shapes.
11	Corsi Frog	Children with learning difficulties of all types may shows problems with visual-spatial skills. This test assesses spatial memory.	Spatial memory is assessed while the child is copying a series of moves by a small frog on a card lily pond.
12	Vocabulary	This test provides a simple measure of receptive vocabulary and reasoning ability.	The child is asked to indicate the right vocabulary from given pictures in a line by drawing a circle on the picture of respective vocabulary.

2.2.1 Scoring

Using the norms of DEST-2:

The normed scored sheets allow to convert each test score into an age appropriate 'At Risk Index'. Each test score has to be allocated into one of five categories: --,-,o,+,++.The − category indicates well below average performance (bottom 10%) on the test, and is a strong risk indicator; - indicates below average performance (bottom 11-25%);o is normal(26-75%); + is above average (76-90%) and ++ is well above average (top 10%).There are different norms for

each six monthly age group between 4:6 and 6:5 and instructions for converting the test scores to normed scores are provided on the Score Sheet.

Deriving the 'At Risk Quotient' (ARQ):

Having derived the at risk indices, the numbers of - - and - scores need to work out. These are at risk indicators. If 4 or more are --, or 7 or more are -- or - , the diagnosis is 'at risk'. For the quantitative ARQ, score 2 for --,1 for -,0 for the remainder, and add up the scores. The ARQ is then the sum divided by the number of tests used (12).Based on the Validation study of the researchers who prepared DEST-2, 0.9 indicates strong risk and scores of 0.6- 0.8 indicates mild risk. This can be shown into the following formula:

"ARQ" = {(2×A) + B} ÷12, Here, A = -- (At strong risk), B = - (At mild risk)

Completing the profile graph:

The Profile chart may also be completed using the set of 12 at risk indices. It provides 'at a glance' indication of the areas of relative strength and relative weakness

2.2.2 Norm:

Norms for each test for each age was developed through extensive series of studies, so that any specific score could be assigned to a percentile point on average performance. One could identify, for instance, that a child's performance of rapid naming fell on the 61st percentile for that age (i.e, the child did better on that test than 60 children out of 100). This was achieved by testing whole classes of children at selected school in Sheffield, England and Wales, with at least 100 children at age 4:6 to 4:11, 5:0 to 5:5, 5:6 to 5.11 and 6:0 to 6:5, establishing performance on each of the norms, and a further 400 to the norms for DEST-2. The scores for each cohort were

then ranked, leading to the development of percentile ranks for each test and each age. Percentile scored was collapsed into five categories shown in the table below:

Table-4: Percentile Scores for the 'at risk' indicators of DEST-2

Score	Risk Level	Percentile
--	High	0-10
-	At risk	11-25
O	Normal (no risk)	26-75
+	Above average (no risk)	76-90
++	Well above average (no risk)	91-100

2.2.3 Reliability:

Test –retest reliability: This was assessed by administering the test on separate occasions around a week apart to groups of children aged from 5.5 to 6.5.In all, 26 children participated. The Correlation was as shown below:

Table 5:   Test-retest reliability

Subtests	Correlation
Rapid Naming	0.751
Bead Threading	0.724
Phonological Discrimination	0.676
Postural Stability	0.833
Rhyme/First Letter	0.837
Forwards Digit Span	0.625
Digit Naming	0.874

Letter Naming	0.878
Sound Order	0.637
Shape Copying	0.806

For DEST-2, test-retest reliability was based on the performance of 21 children.

Table-6: Test-retest reliability for the additional tests in the DEST-2

Corsi Frog	.548
Vocabulary	.596

Inter-rater agreement

Most of the sub-tests are fully objective and there is therefore little or no possibility of differences in interpretation between different testers.Inter-rater reliability for the two experienced testers was 0.98. Inter-rater reliability between the inexperienced tester and each of the experienced testers was 0.94

Test Intercorrelations

Three separate standardization studies were undertaken. In the main study (910 children), data for nine tests were collected, and a further study (500 children) was required to collect the data for the copying data. Inter-correlations between copying and the other tests derive from a small sample (25 children), For DEST-2, the Intercorrelations for the Corsi frog and the vocabulary were also derived from a small sample (30 children).

2.2.4 Validity

It is normal in psychometric test to provide data relating to the validity of the test(that is, the evidence that it does indeed measure the construct that it is claimed to measure-in this case dyslexia). Concurrent validity is established by comparing the test with some existing test for the construct in question. Clearly this was not possible with the DEST because one of the main motivations for developing the DEST was the absence of such a test! Construct validity could be established by undertaking an exhaustive series of tests aimed to provide evidence of whether or not a child is dyslexic, but even this is not possible, because there really is no method of establishing whether a child is dyslexic before he or she starts to learn to read.

According to Nicolson I. and Fawcett J. (2004), there were three major views on the origin of dyslexia. The first one is the well established 'Phonological Deficit Hypothesis' hold that phonological difficulty causes the subsequent reading problems. Secondly, neurologically based hypothesis suggests that dyslexic children have difficulties in rapid processing of auditory stimuli owing to impairment in magnocellular auditory pathway. A third hypothesis suggests that dyslexic children have difficulty in automatising skills, probably because of impairment in the cerebellum which leads to problems in fluently analyzing speech sound, in remembering the letters in alphabet and their related sound and remembering spellings.

Consequently in designing the set of tests the developer of DEST-2 spread the net widely, including tests derived from each of the main theories. The rhyme and phonological discrimination tests are based on all three theories, the rapid naming test is based on phonological deficit and celebellar impairment theories, the sound order test is based on magnocellular pathway impairment, and the beads test, the copying test and the postural stability

test are based on the cerebellar impairment theories. In Dest-2, the corsi frog test is based on evidence of visual deficits in dyslexia, which have been associated with magnocellar theory. The letter and digit naming tests are tests of attainment. Reduced memory span is in fact thought to be one of the best indicators of dyslexia at any age (Miles and Miles, 1990;Thomas and Watkins,1990). In short all 12 tests are firmly grounded in current theories of the origins of dyslexia.

Finally, considering existing methods for diagnosing dyslexia in older children, the DEST-2 has a companion test –the Dyslexia Screening Test, following a very similar format, and with tests adjusted to take into account the greater attainments and skills of the older children. The DST has been reasonably well validated, in that a panel of 17 previously diagnosed dyslexic children and 20 control children were tested on it. All children two were correctly classified, and when the two misdiagnosed dyslexic children were given a further formal diagnostic test for dyslexia, it turn out that their reading and spelling had improved to the extent that they were no longer classifiable as dyslexic. The construct validity of the DST therefore provides further convergent evidence as to the construct validity of the DEST-2, since both tests measure the same set of skills including phonological and cerebellar skills.

2.2.5   Some equipments were necessary for conducting the subtests of DEST-2:

1. DEST-2 Manual

2. Rapid naming cards, Digit naming card, Letter naming card, Shape Copying Card and Pond card.

3. Beads and cord, frog, cassette tapes (Digit Span and sound order).

4. Permission letter to parents (Pilot Study) or school authority(Main Study)

5. Photocopy of Vocabulary cards 6 and 7.

6. Stopwatch.

7. Paper and pencil

2.3   Procedures

DEST-2 was administered to the thirty participants of Pilot Study one by one by the researcher of the present study with due permission from their parents. In pilot study the test was administered mostly at the participants' house and also at the researcher's house. Parents signed a consent letter before administering the test on the child and also provided some demographic information about the child and about themselves. At the same time opinion and suggestions about the items of all of the subtests were collected through a face to face interview from twelve judges. At this stage of the work, after the data analysis of the pilot study, it was seen that participants from Bangla medium schools did poor in half of the subtests of DEST-2 compared to the participants of English medium school. Even the researcher observed while administering the tests on participants of Bangla medium schools that they had problem in understanding the instruction in English in many cases. Besides three experts two from abroad and one from our country (their name and designation are given in the discussion section) suggested that main study needed to be done on English Medium schools Children. . At this stage of study, it was decided to administer the DEST-2 only on the children of English Medium Schools. Therefore, in the main study, DEST-2 was administered to the children of three English medium schools with due permission from school authority from Dhaka, Rajshahi and Chittagong Cities. In main study the test was administered on children at schools. The participants of the main study were selected based on the teachers' comments and observations about their academic performances. Specially, children who had poor academic performances were taken as participants to fulfill the objectives of the present study. Twenty eight children from Dhaka, fifteen children from Rajshahi and seventeen

children from Chittagong were selected for the main study. Demographic information were collected from the teachers and school records with the help of school authority. Comments about the probable nature and problems of dyslexia were collected from twenty teachers from those three English Medium schools of Dhaka, Rajshahi and Chittagong through a subjective questionnaire made by the researcher. The data got from the DEST-2 administration were recorded into the score sheet of DEST-2 and then converted into At Risk Quotient (ARQ) with the help of DEST-2 norm sheets. The relevant data of the DEST-2 Along with the demographic data of the participants of both pilot and main study were entered into the SPSS software for further analysis to reach to the findings from the present research.

Chapter-3: Result

Results

The data of the present study was analyzed through Pearson Chi-Square by using SPSS software and percentages of certain variables. The data was analyzed into two steps considering the two phases of the present study to fulfill the objectives of the study. In the first step, the data gathered from the Pilot study was being analyzed which is shown through the table no. 7 to 20. To see the utility of Dyslexia Early Screening Test, Second Edition (DEST-2) in our country i) twelve judges' opinion was collected over the twelve subtests of DEST-2 reported in table 7 to 10 and ii)subtest wise screening diagnosis was calculated through Pearson Chi- Square which are been reported in table 11 . To determine the probable nature and problem of dyslexia among the young children of Bangladesh, iii) screening diagnosis in terms of medium of school and gender was estimated through Pearson Chi- Square which are been reported in table 12 and iv) no. and percentages of participants who were at risk level and answered correctly in eight of the subtests (rest of the four subtest don't have any item wise distribution) were estimated which are presented through tables 13 to 20.

The next step shows the data analysis of the main study through the table no. 21 to 28.To see whether there is any relation between poor academic performances and being at risk of dyslexia, v) screening diagnosis of the Participants of main study in terms of Location and Gender was calculated through Pearson Chi- Square which are been reported in table 22 and to determine the probable nature and problem of dyslexia among the young children of Bangladesh, vi) Subtest wise screening diagnosis of the participants of Dhaka, Rajshahi and Chittagong City were calculated through Pearson Chi- Square which are been reported through table 23 to 25 ;vii)detailed at risk index of three participants who are labeled as Case I, Case II and Case III from Dhaka, Rajshahi and Chittagong respectively are reported in table 26 to 27 and viii) twenty

teachers' comments about the symptoms of dyslexia among the young children they teach in schools of Bangladesh is presented through table 28.

Table 7: Opinion regarding the items of nine of the subtests

Subtests	Percentage (%) of the judges suggested 'no change'
Test 1: Rapid Naming	100%
Test 2: Bead Threading	100%
Test 4: Postural Stability	100%
Test 6: Forwards Digit Span	100%
Test 7: Digit Naming	100%
Test 8: Letter Naming	100%
Test 9: Sound Order	100%
Test 10 Shape Coping	100%
Test 11: Corsi Frog	100%

Table 7 shows that all of the judges suggested no change for any of the items of nine of the subtests mentioned in the table i.e. all of them agreed that these subtests are appropriate for the children aged 4.5 years to 6.5 years from both English and Bangla medium schools of Bangladesh.

Table 8: Opinion regarding the items of Phonological Discrimination

Items	Percentage (%) of judges suggested the item appropriate for the children aged 4.5 to 6.5 years	Percentage (%) of judges suggested the item inappropriate for the children aged 4.5 to 6.5 years
bad dad, cap cap, day day, fat fat, leg leg, fan van, pin thin	100	0
lip limp, cub cup	50	50

Table 8 shows, all of the judges suggested that seven of the items of Phonological Discrimination subtest were appropriate for the children aged 4.5 to 6.5 years from both English and Bangla medium schools in Bangladesh; and half of the judges suggested that rest of the two of the items were appropriate for the children aged 4.5 to 6.5 years from both English and Bangla medium schools in Bangladesh.

Table 9: Opinion regarding the items of Rhyme detection/First Letter

Items	Percentage (%) of judges suggested the item/word appropriate for the children aged 4.5 to 6.5 years	Percentage (%) of judges suggested the item/word inappropriate to the children aged 4.5 to 6.5 years
Leg hen, cup pup, dog, hat, tap, net	100	0
pin win, hop doll, mud bud, wing sing	91.67	8.33
toe toad	33.33	66.67
peg pet	50	50
Sack	75	25

Table 9 shows, all of the judges suggested that six of the items among fourteen items of Rhyme Detection/First Letter subtest were appropriate for the children aged 4.5 to 6.5 years from both English and Bangla medium schools in Bangladesh; Most of them suggested that rest of the items except the one 'toe toad' were appropriate for the children aged 4.5 to 6.5 years from both English and Bangla medium schools in Bangladesh.

Table 10: Opinion regarding the items of Vocabulary

Items	Percentage(%) of judges suggested the item /vocabulary appropriate for the children aged 4.5 to 6.5 years	Percentage (%) of judges suggested the item /vocabulary inappropriate for the children aged 4.5 to 6.5 years	Percentage (%) of judges suggested the picture/s inappropriate for the children aged 4.5 to 6.5 years
Seesaw	33.33	50	16.66
Pineapple	66.67	0	33.33
Camel	75	0	25
Lizard	0	16.66	100
Volcano	0	75	25
Light Bulb	83.33	0	16.67
Autumn	0	83.33	16.67
Canoe	8.33	91.67	0
Jellyfish	0	91.67	8.33
Habit	8.33	91.67	**0**

Table 10 indicates, most of the judges suggested that almost all of the items of the Vocabulary

subtest were inappropriate in terms of vocabulary or picture for the children aged 4.5 to 6.5 years

from both English and Bangla medium schools in Bangladesh. In case of very few items most of them mentioned that those items were appropriate for the mentioned age group.

Table-11: Subtest wise screening diagnosis of Pilot Study

Subtest	At Risk Index	Total No. of Participant	(%) N=30	No. of Participants of English Medium School	(%) N=15	No. of Participants of English Medium School	(%) N=15
Rapid Naming	**--,-**	11	36.67	5	33.33	6	40
(RN)	**0,+,++**	19	63.33	10	66.67	9	60
Bead	**--,-**	5	16.67	3	20	2	13.33
Threading(BT)	**0,+,++**	25	83.33	12	80	13	86.67
Phonological	**--,-**	11	36.67	4	26.67	7	46.67
Discrimination	**0,+,++**	19	63.33	11	73.33	8	53.33
PD							
Postural	**--,-**	2	6.67	2	13.33	0	0
Stability (PS)	**0,+,++**	28	93.33	13	86.67	15	100
Rhyme/First	**--,-**	22	73.33	9	60	13	86.67
Letter (RDF)	**0,+,++**	8	26.67	6	40	2	13.33
Forwards Digit	**--,-**	21	70	9	60	12	80
Span (FDS)	**0,+,++**	9	30	6	40	3	20

Digit	--,-	8	26.67	4	26.67	4	26.67
Naming(DN)	0,+,++	22	73.33	11	73.33	11	73.33
Letter	--,-	9	30	3	20	6	40
Naming(LN)	0,+,++	21	70	12	80	9	60
Sound Order	--,-	8	26.67	4	26.67	4	26.67
(SO)	0,+,++	22	73.33	11	73.33	11	73.33
Shape	--,-	2	6.67	1	6.67	1	6.67
Copying(SC)	0,+,++	28	93.33	14	93.33	14	93.33
Corsi Frog(CF)	--,-	11	36.67	6	40	5	33.33
	0,+,++	19	63.33	9	60	10	66.67
Vocabulary	--,-	25	83.33	11	73.33	14	93.33
(VOC)	0,+,++	5	16.67	4	26.67	1	6.67

Here, (--), (-)= Below Average; (0) = Average;(+),(++) =Above Average

Table 11 indicates that more than half of the participants of the pilot study scored Average or Above Average at each of the subtests of DEST-2 except three of the subtests: Rhyme Detection/First Letter, Forward Digit Span and Vocabulary where very few of the participants scored Average or Above Average. It was also seen that more participants from Bangla medium schools scored below average on six of the subtests including the three subtests (Rapid Naming, Phonological Discrimination, Rhyme Detection/First Letter, Forward Digit Span, Letter Naming and Vocabulary) mentioned above than the participants of English Medium schools. Only in three of the subtests (Bead Threading, Postural Stability and Cosi Frog) less participants from Bangla medium schools scored below average than the participants of English Medium Schools

and in rest of the three of the subtests (Digit Naming, Sound Order and Shape Copying) equal number of participants both from English and Bangla Medium Schools scored below average.
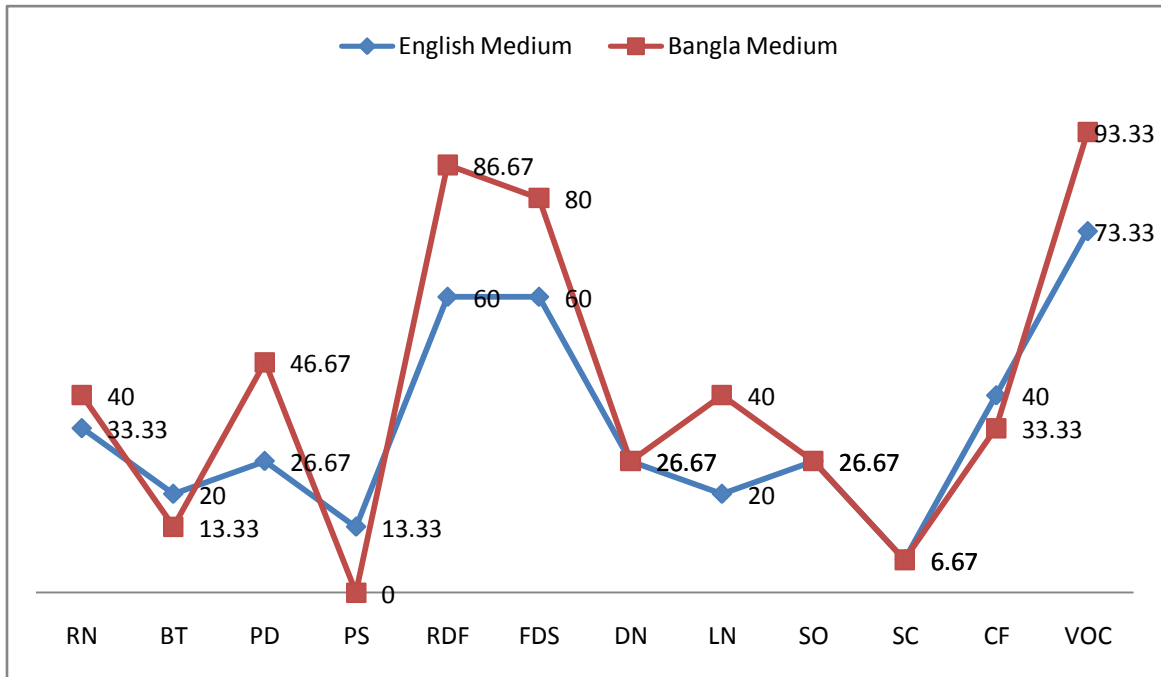
Figure 3: Percentages of participants of pilot study from English and Bangla medium schools who scored below average in twelve of the subtests of DEST-2

Table-12: Screening diagnosis and respective percentages (%) in terms of Medium of School and Gender of Pilot Study

Screening Diagnosis	Medium of school		Gender	
	English	Bangla	Male	Female
Absent	9	6	9	6
%	30	20	30	20
Mildly at risk	3	5	2	6
%	10	16.67	6.67	20
Strongly at risk	3	4	5	2
%	0	13.33	16.67	6.67

Table -12 shows that more participants from Bangla Medium Schools were at risk of dyslexia than the participants from English Medium Schools; male participants were more at Strongly at Risk level (SAR) than Mildly at Risk (MAR) level of Dyslexia; and female participants were more at MAR than SAR level of Dyslexia.

Table-13:No. and percentage of participants who were being at risk of dyslexia and answered correctly in Phonological Discrimination Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%) N=8	No. of participants who answered correctly	Percentage (%) N=7
Bad dad	5	62.5	2	28.57
Cap cap	8	100	1	14.29
Day day	7	87.5	0	0
Pin thin	8	100	1	14.29
Lip limp	5	62.5	1	14.29
Fat fat	5	62.5	2	28.57
Cub cup	4	50	0	0
Leg leg	7	87.5	2	28.57
Fan van	5	62.5	1	14.29

Table 13 shows that more than half of the participants who were Mildly at Risk answered correctly in all of the items of Phonological Discrimination, only except the item 'cub cup' where exactly half of the participants answered correctly. Table 13 also shows that very few of

the participants and in case of two items no participants who were Strongly at Risk answered correctly.

Table-14: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Rhyme Detection/First Letter Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%)	No. of participants who answered correctly	Percentage (%)
Leg hen	0	0	0	0
Pin win	0	0	0	0
Cup pup	0	0	0	0
Hop doll	0	0	0	0
Toe toad	0	0	0	0
Mud bud	0	0	0	0
Peg pet	0	0	0	0
Wing sing	0	0	0	0

Dog	6	75	1	14.29
Sack	5	62.5	1	14.29
Hat	5	62.5	1	14.29
Tap	5	62.5	1	14.29
Net	5	62.5	1	14.29

Table 14 shows that no participants who were Mildly at Risk (MAR) and Strongly at Risk (SAR) answered correctly in all the items of Rhyme Detection; but in case of First Letter part most of the participants who were MAR answered correctly and very few participants who were SAR answered correctly.

Table-15: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Forwards Digit Span Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	**Percentage (%) N=8**	**No. of participants who answered correctly**	**Percentage (%) N=7**
5 1	7	87.5	4	57.14
3 9	4	50	2	28.57
1 3 6	2	25	1	14.29
4 9 5	2	25	3	42.86
7 6 4 2	2	25	0	0
5 8 4 7	2	25	1	14.29
7 4 6 5 8	1	12.5	0	0
8 6 1 3 9	1	12.5	0	0
7 5 4 3 1 6	1	12.5	0	0
9 7 5 2 4 3	0	0	0	0

1 3 4 7 9 6	1	12.5	0	0
2 1 3 4 8 7 5	0	0	0	0
1 7 2 9 6 3 5 8	0	0	0	0
5 7 6 4 8 1 3 2	0	0	0	0

Table 15 shows that very few of the participants who were MAR and SAR answered correctly in all of the items of Forwards Digit Span subtest.

Table-16: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Digit Naming Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%) N=8	No. of participants who answered correctly	Percentage (%) N=7
4	8	100	1	14.29
8	6	75	1	14.29
3	8	100	1	14.29
9	7	87.5	2	28.57

5	7	87.5	2	28.57
7	7	87.5	1	14.29
6	6	75	1	14.29

Table 16 shows that most of the participants who were Mildly at Risk answered correctly and very few of the participants who were Strongly at Risk answered correctly in all of the items of Digit Naming.

Table-17: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Letter Naming Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%) N=8	No. of participants who answered correctly	Percentage (%) N=7
t	5	62.5	1	14.29
s	6	75	1	14.29
d	4	50	1	14.29
e	6	75	1	14.29

w	7	87.5	3	42.86
o	8	100	1	14.29
b	4	50	1	14.29
q	3	37.5	1	14.29
n	6	75	1	14.29
y	6	75	1	14.29

Table 17 shows that most of the participants who were mildly at risk answered correctly and very few of the participants who were strongly at risk answered correctly in all of the items of Letter Naming.

Table-18: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Sound Order Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%) N=8	No. of participants who answered correctly	Percentage (%) N=7
mouse	7	87.5	4	57.14
Duck	7	87.5	3	42.86
mouse	7	87.5	3	42.86
mouse	7	87.5	4	57.14
Duck	7	87.5	2	28.57
mouse	7	87.5	4	57.14
Duck	6	75	3	42.86
Duck	7	87.5	2	28.57
Duck	7	87.5	2	28.57
Mouse	7	87.5	4	57.14

Mouse	**6**	**75**	**2**	**28.57**
Duck	**6**	**75**	**2**	**28.57**
Duck	**5**	**62.5**	**3**	**42.864**
Mouse	**7**	**87.5**	**4**	**57.14**
Mouse	**6**	**75**	**1**	**14.29**
Duck	**7**	**87.5**	**2**	**28.57**

Table 18 shows that most of the participants who were mildly at risk answered correctly and very few of the participants who were strongly at risk answered correctly in all of the items of Sound Order.

Table-19: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Corsi Frog Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%) N=8	No. of participants who answered correctly	Percentage (%) N=7
4 2	7	87.5	3	42.86
5 1	7	87.5	1	14.29
1 3 6	7	87.5	2	28.57
5 3 7	4	50	1	14.29
7 6 4 2	3	37.5	0	0
6 1 3 4	2	25	0	0
2 4 7 3 5	1	12.5	0	0
4 6 1 3 7	0	0	0	0
7 5 4 3 1 6	0	0	0	0
1 7 5 2 4 3	0	0	0	0

1 3 4 7 5 6 2	0	0	0	0
2 1 3 4 6 7 5	0	0	0	0
1 7 2 4 6 3 5 2	0	0	0	0
5 7 6 4 1 3 2	0	0	0	0

Table 19 shows that most of the participants who were mildly at risk answered correctly in case of first three items; otherwise very few of the participants who were mildly at risk answered correctly only in item four to eight and in rest of the items no participants answered correctly; very few of the participants who were strongly at risk answered correctly only in the first four items and in rest of the items no participants answered correctly.

Table-20: No. and percentage of participants who were being at risk of dyslexia and answered correctly in Vocabulary Subtest

Item	Mildly At Risk		Strongly At Risk	
	No. of participants who answered correctly	Percentage (%)	No. of participants who answered correctly	Percentage (%)
Seesaw	3	37.5	4	57.14
Pineapple	7	87.5	5	71.43
Camel	2	25	4	57.14
Lizard	4	50	5	71.43
Volcano	5	62.5	3	42.86
Light Bulb	3	37.5	4	57.14
Autumn	1	12.5	0	0
Canoe	1	25	1	14.29
Jellyfish	4	50	3	42.86
Habit	0	0	0	0

Table 20 shows that in most of the items of Vocabulary (Seesaw, Camel, Autumn, Canoe and Habit) subtest very few of the participants who were mildly at risk answered correctly except four items (Pineapple, Lizard, Volcano and Jellyfish) where most of them answered correctly; Table 20 also shows that in half of the items (Volcano, Autumn, Canoe, Jellyfish and Habit) very few of the participants who were strongly at risk answered correctly.

Table 21: Criteria of poor academic performances of participants from main study based on teachers' comments and observation

Sl. No.	Criteria of poor academic performances
1	Takes time to understand or grasp the concepts
2	Weak and slow in reading ,writing, spelling and speaking
3	Faces difficulties in recognizing letters and numbers
4	Takes much time to complete class work
5	Comprehends instruction slowly and follows few of the instructions
6	Weak in comprehending instructions in English
7	Repeats classes
8	Absent minded in the class and lack of attention in study
9	Problems in memorizing and forgets concepts easily

10	Loose track or flow of learning if the learning environment is not organized
11	Does less interaction with the teachers
12	Needs continuous individual attention, monitoring, guidance and nagging by teachers to complete class works

Table 21 represents the summary of the comments and observations by the teachers from Dhaka, Rajshahi and Chittagong about the criteria of poor academic performances of the participants who were selected for the main study.

Table 22: Screening diagnosis of participants of main study in terms of location and gender

Location	*Gender*	*Screening Diagnosis*					
		Absent	%	Mildly At Risk	%	Strongly At Risk	%
Dhaka, N=28	Male	6	21.43	8	28.57	3	10.71
	Female	4	14.29	3	10.71	4	14.29
Total	N=28	10	35.71	11	39.29	7	25
Rajshahi N=15	Male,	4	26.67	4	26.67	1	1.86
	Female	2	13.33	2	13.33	2	13.33
Total	N =15	6	40	6	40	3	20
Chittagong N=17	Male	4	23.53	2	11.76	2	11.76
	Female	4	23.53	3	17.65	2	11.76
Total	N = 17	8	47.06	5	29.41	4	23.53

Table 22 also indicates that more than half of the participants, who had poor academic performances, from each of the locations were at risk of dyslexia. More participants from Dhaka City were being at risk of dyslexia than Rajshahi and Chittagong. In Dhaka City, male participants were more at mildly risk of dyslexia than strongly at risk and female were more at strongly risk than mildly at risk of dyslexia. In Rajshahi, male participants were more at mildly risk of dyslexia than strongly at risk and female were equally mildly at risk and strongly at risk of dyslexia. In Chittagong city, male participants were equally mildly at risk and strongly at risk of dyslexia and female participants were more at mildly risk of dyslexia than strongly at risk.
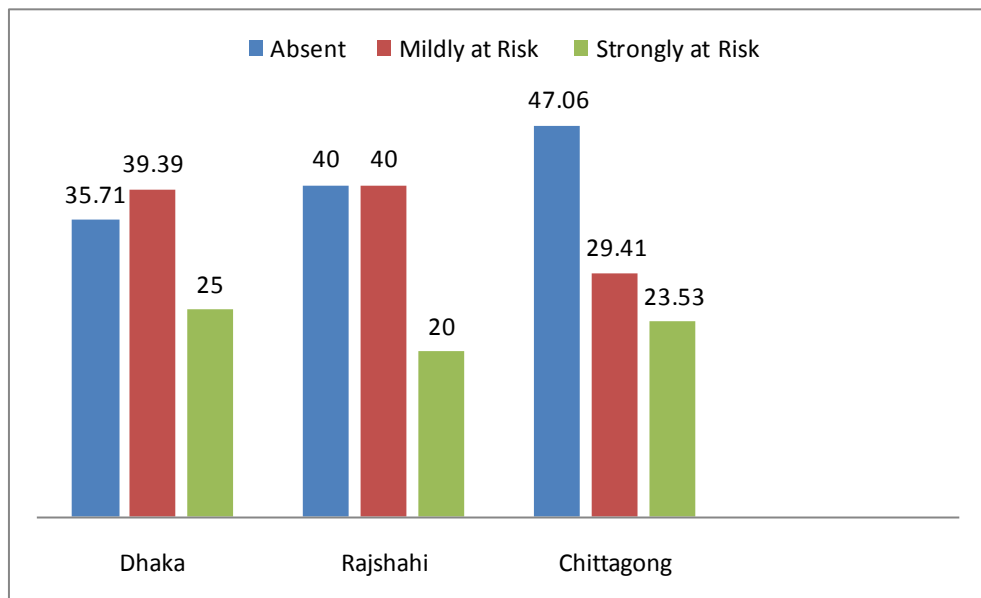
Figure 4: Percentages of screening diagnosis of the participants of main study
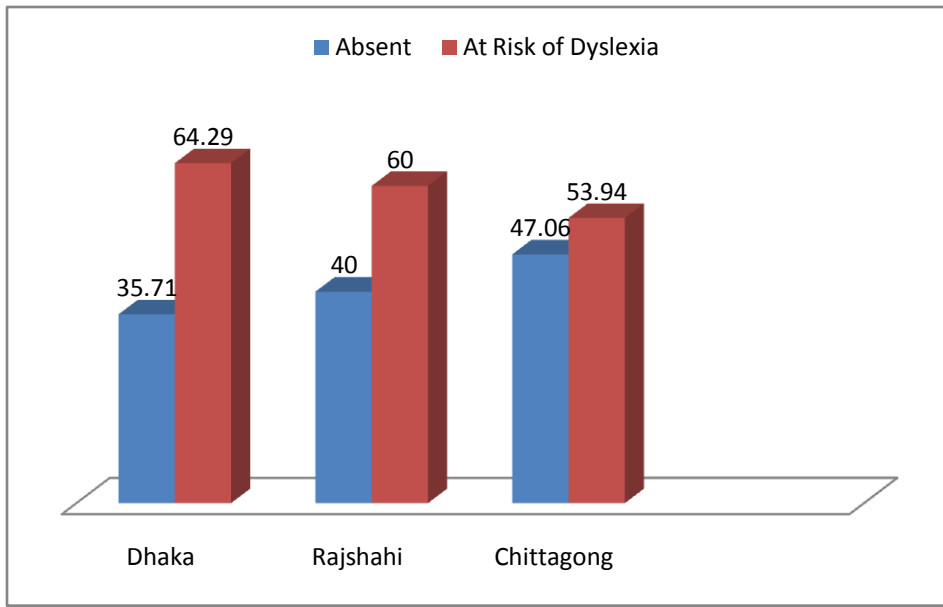
Figure 5: Percentages of total at risk level of the participants of main study

Table 23: Subtest wise screening diagnosis of the participants of Dhaka City

Subtest	At Risk Level	No. of Participant	Percentage (%) N=28
Rapid Naming	**--,-**	9	32.14
	0,+,++	19	67.86
Bead Threading	**--,-**	11	39.29
	0,+,++	17	60.71
Phonological Discrimination	**--,-**	9	32.14
	0,+,++	19	67.86
Postural Stability	**--,-**	0	0
	0,+,++	28	100
Rhyme Detection/ First Letter	**--,-**	23	82.14
	0,+,++	5	17.86

Forwards Digit Span	**--,-**	21	75
	0,+,++	7	25
Digit Naming	**--,-**	1	3.57
	0,+,++	27	96.43
Letter Naming	**--,-**	4	14.29
	0,+,++	24	85.71
Sound Order	**--,-**	21	75
	0,+,++	7	25
Shape Copying	**--,-**	0	0
	0,+,++	28	100
Corsi Frog	**--,-**	25	89.29
	0,+,++	3	10.71
Vocabulary	**--,-**	23	82.14
	0,+,++	5	17.86

Here, (--), (-)= Below Average; (0) = Average;(+),(++) =Above Average

Table 23 shows that more participants of Dhaka city scored at average or above average level than the below average level in seven of the subtests except five of the subtests (Rhyme Detection/First Letter, Forward Digit Span, Sound Order and Vocabulary) where very few of the participants scored Average or Above Average.

Table 24: Subtest wise screening diagnosis of the participants of Rajshahi City

Subtest	At Risk Level	No. of Participant	Percentage (%) N=15
Rapid Naming	--,-	7	46.67
	0,+,++	8	53.33
Bead Threading	--,-	1	6.67
	0,+,++	14	93.33
Phonological Discrimination	--,-	3	20
	0,+,++	12	80
Postural Stability	--,-	0	0
	0,+,++	15	100
Rhyme Detection/ First Letter	--,-	13	86.67
	0,+,++	2	13.33
Forwards Digit Span	--,-	11	73.33
	0,+,++	4	26.67
Digit Naming	--,-	1	6.67
	0,+,++	14	93.33
Letter Naming	--,-	4	26.67
	0,+,++	11	73.33
Sound Order	--,-	9	60
	0,+,++	6	40
Shape Copying	--,-	0	0
	0,+,++	15	100

Subtest	At Risk Level	No. of Participant	Percentage (%)
Corsi Frog	**--,-**	**12**	**80**
	0,+,++	**3**	**20**
Vocabulary	**--,-**	**13**	**86.67**
	0,+,++	**2**	**13.33**

Here, (--), (-)= Below Average; (0) = Average;(+),(++) =Above Average

Table 24 shows that more participants of Rajshahi city scored at average or above average level than the below average level in seven of the subtests except five of the subtests (Rhyme Detection/First Letter, Forward Digit Span, Sound Order and Vocabulary) where very few of the participants scored Average or Above Average.

Table 25: Subtest wise screening diagnosis of the participants of Chittagong City

Subtest	At Risk Level	No. of Participant	Percentage (%) N=17
Rapid Naming	**--,-**	**8**	**47.06**
	0,+,++	**9**	**52.94**
Bead Threading	**--,-**	**4**	**23.53**
	0,+,++	**13**	**76.47**
Phonological Discrimination	**--,-**	**9**	**52.94**
	0,+,++	**8**	**47.06**
Postural Stability	**--,-**	**0**	**0**
	0,+,++	**17**	**100**
Rhyme Detection/ First Letter	**--,-**	**16**	**94.12**
	0,+,++	**1**	**5.88**
Forwards Digit	**--,-**	**15**	**88.24**

Span	**0,+,++**	**2**	**11.76**
Digit Naming	**--,-**	**0**	**0**
	0,+,++	**17**	**100**
Letter Naming	**--,-**	**1**	**5.88**
	0,+,++	**16**	**94.12**
Sound Order	**--,-**	**10**	**58.82**
	0,+,++	**7**	**41.18**
Shape Copying	**--,-**	**0**	**0**
	0,+,++	**17**	**100**
Corsi Frog	**--,-**	**9**	**52.94**
	0,+,++	**8**	**47.06**
Vocabulary	**--,-**	**15**	**88.24**
	0,+,++	**2**	**11.76**

Here, (--), (-)= Below Average; (0) = Average;(+),(++) =Above Average

Table 25 shows that more participants of Chittagong city scored at average or above average level than the below average level in six of the subtests except rest of the six subtests (Phonological Discrimination, Rhyme Detection/First Letter, Forward Digit Span, Sound Order and Vocabulary) where very few of the participants scored Average or Above Average.

Table 26: Detailed at risk index of three participants of Dhaka, Rajshahi and Chittagong whose ARQ indicated strongly at risk of dyslexia

Subtest	At Risk Index		
	Case I	Case II	Case III
Test 1:Rapid Naming	--	--	--
Test 2:Bead Threading	--	0	0
Test 3:Phonological Discrimination	-	-	--
Test 4:Postural Stability	++	++	++
Test 5:Rhyme/First Letter	--	--	--
Test 6:Forwards Digit Span	--	--	--
Test 7:Digit Naming	++	++	++
Test 8:Letter Naming	++	++	++
Test 9:Sound Order	--	--	+
Test 10: Shape Copying	0	++	++
Test 11:Corsi Frog	-	0	-
Test 12:Vocabulary	0	--	--

Table 26 indicates that all three participants from Dhaka, Rajshai and Chittagong scored strongly at risk indicators (--) in Rapid Naming, Rhyme/First Letter and Forwards Digit Span subtests; either strongly at risk (--) or at risk (-) indicators in Phonological Discrimination;

Table 27: No. of at risk Indicators of three participants from Dhaka, Rajshahi and Chittagong whose ARQ indicated strongly at risk of Dyslexia according to twelve subtests of DEST-2

Case	Case I	Case II	Case III
'At Risk' Indicator			
Strongly At Risk Indicator (--)	5	5	5
At Risk Indicator(-)	2	1	1
Normal or No Risk (0)	2	2	1
Above Average (+)	0	0	1
Well Above Average(++)	3	4	4
ARQ	1	0.92	0.92

Table 27 indicates that case I, case II and case III scored strongly at risk indicators on five of the subtests, seven subtests and scored at risk indicators on two subtests, one subtests and one of the subtests respectively.
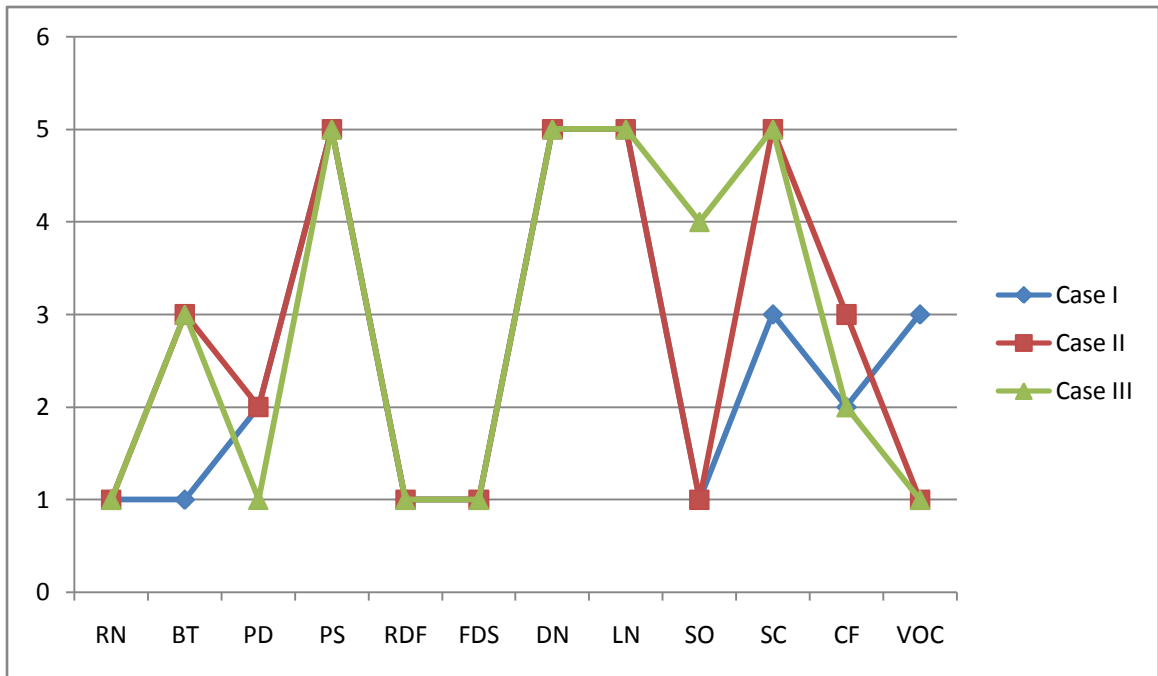
Figure 6: At risk index of three of the cases at twelve subtests of DEST-2

Here it is supposed that, 5 = (++), 4= (+), 3= (0), 2= (-) and 1 = (--)

Table 28: Summary of teachers comments on the probable nature of Dyslexia among of young children in schools of Bangladesh

Sl. No.	Probable nature of dyslexia
1	Slow in learning
2	Face difficulty in recognizing letters and numbers
3	Problem in writing and get confused with letters. For example, confused with 'b , 'd' & q; f &t
4	Difficulty in Reading and spelling
5	Needs additional time to grasp the concept and comprehend as well.
6	Takes time to understand and follow instruction and to finish class work
7	Problem in memorizing
8	Inattentive in study
9	Lives in imaginary word; most often staring through window
10	Disturb other students as they are not interested in class work.

Table 28 represents the comments of the twenty teachers about the symptoms of dyslexia which might be present among some of their students in school.

Chapter 4: Discussion

Discussion

The data of the present study was analyzed through Pearson Chi-Square by using SPSS software and percentages of certain variables. The data was analyzed into two steps considering the two phases of the present study to fulfill the objectives of the study. In the first step, the data gathered from the Pilot study was being analyzed which is shown through the table no. 7 to 20. To see the utility of Dyslexia Early Screening Test, Second Edition (DEST-2) in our country i) twelve judges' opinion was collected over the twelve subtests of DEST-2 reported in table 7 to 10 and ii)subtest wise screening diagnosis was calculated through Pearson Chi- Square which are been reported in table 11 . To determine the probable nature and problem of dyslexia among the young children of Bangladesh, iii) screening diagnosis in terms of medium of school and gender was estimated through Pearson Chi- Square which are been reported in table 12 and iv) no. and percentages of participants who were at risk level and answered correctly in eight of the subtests (rest of the four subtest don't have any item wise distribution) were estimated which are presented through tables 13 to 20. The next step shows the data analysis of the main study through the table no. 21 to 28.To see whether there is any relation between poor academic performances and being at risk of dyslexia, v) screening diagnosis of the Participants of main study in terms of Location and Gender was calculated through Pearson Chi- Square which are been reported in table 22 and to determine the probable nature and problem of dyslexia among the young children of Bangladesh, vi) Subtest wise screening diagnosis of the participants of Dhaka, Rajshahi and Chittagong City were calculated through Pearson Chi- Square which are been reported through table 23 to 25 ;vii)detailed at risk index of three participants who are labeled as Case I, Case II and Case III from Dhaka, Rajshahi and Chittagong respectively are

reported in table 26 to 27 and viii) twenty teachers' comments about the symptoms of dyslexia among the young children they teach in schools of Bangladesh is presented through table 28.

Findings from the pilot study indicates that most of the subtests of Dyslexia Early Screening Test, Second Edition, (DEST-2) would be appropriate for the children aged 4.5 to 6.5 years both from English and Bangla medium schools in Bangladesh. According to all of the judges whose opinion were taken about the subtests of DEST-2, nine of the subtests viz. Rapid Naming, Bead threading, Postural Stability, Forward Digit Span, Digit Naming, Letter Naming, Sound Order, Shape Copying and Corsi Frog were fully suitable to use with children of our country. For rest of the three subtests-Phonological Discrimination, Rhyme Detection/First Letter and Vocabulary – they suggested some changes. But most of them suggested all of the items of Phonological Discrimination, Rhyme Detection/First Letter was appropriate for children of our country except few items which were needed to change (table 8 & 9).It was seen that almost all of the judges said that the subtest vocabulary were not appropriate for the children aged 4.5 to 6.5 years in Bangladesh (table 10) and they suggested changes about some of the items .For example, all of the judges strongly recommended to change the item 'Habit' which indicates kind of religious cloth usually monk use to wear. But this vocabulary and the picture is very unfamiliar to the Bangladeshi children aged 4.5 to 6.5 and even above than this age range. So, they suggested some alternative vocabulary like some of the Bangladeshi dress 'Paijama,Panjabi and Tupi', 'Shari/Saloar Kamij', 'Pant-Shirt' instead of 'Habit'.

The researcher of the present study also observed the fact about the subtests of DEST-2 suggested by the judges which were more evident through the finding from table 11 which indicates subtest wise screening diagnosis of the participants of pilot study. Findings suggests that more than half of the participants of the pilot study scored Average or Above Average at

each of the subtests of DEST-2 except three of the subtests: Rhyme Detection/First Letter, Forward Digit Span and Vocabulary where very few of the participants scored Average or Above Average. Therefore, it can be said that most of the subtests of DEST-2 are suitable for the Bangladeshi children aged 4.5 to 6.5 years. This finding is quite similar with the opinion of judges about the utility of the subtests of DEST-2 in Bangladesh. But at the same time, findings also indicate that the performances of participants from Bangla medium schools were poor than the participants of English medium schools at most of the subtests of DEST-2.They scored below average on six of the subtests (Figure 3) which was the reasons for them being at risk of dyslexia than that of the participants of English Medium schools (Table 12) . Even the researcher observed while administering the tests on participants of Bangla medium schools that they had problem in understanding the instruction in English in many areas of the test. Besides three experts two from abroad, Dr. Linda Gilmore, Professor and Educational Psychologist, Queensland University of Technology, Australia; Sohail Kassabry, School Psychologist, American International Schools Dhaka and one from our country, Dr. Hamida Akter Begum, Ex-Faculty of Department of Psychology, University of Dhaka suggested that main study needed to be done on English Medium schools Children. At this stage of study, it was decided to administer the DEST-2 only on the children of English Medium Schools and was being administered accordingly on the children of three English medium schools from Dhaka, Rajshahi and Chittagong. Because poor performances by the DEST-2 subtest may not express the exact findings about the at risk level of dyslexia among the Bangla medium students as it was already seen from the judges' comments and the researcher's observation while administering the test that some of the subtests would be tough for the Bangla medium school children than the English

medium school participants as DEST-2 a screening test from England and it's items are standardized according to English culture.

Findings from the pilot study also suggests that participants who were at risk level of dyslexia specially strongly at risk of dyslexia performed very poor at each of the twelve subtests; participants at mildly at risk performed good at some of the subtests but not at all of those. Each of the subtests of DEST-2 measures certain areas of children. So, weakness in particular subtests indicates the pattern or nature of the specific learning difficulty or dyslexia. Besides, the British Dyslexia Association (BDA) Management Board (2007) mentioned certain areas while defining dyslexia viz. phonological processing, rapid naming, working memory, processing speed, and the automatic development of skills and indicated that difficulties over those areas are characterized as dyslexia.

As children of age 4.5 to 6.5 taken in the present study were very junior graders (Play to KG), their assessment of academic performances are done by the teachers in daily basis at the mentioned schools at each of the cities where the researcher collected the data. The young graders were not given any grade or score for representing their academic performances except only teachers' comments and observation on grasping the study or learning in the classroom. And teachers' comments were the assessment tools for measuring the poor academic performances of the participants of main study of the present research; table 21 gives a summary of it. Some information about their development and improvement academically and behaviorally were also collected from the school records. Table 22 indicates the screening diagnosis of participants, who were selected by the teachers' comments based on their poor academic performances, by DEST-2.Findings in this regard indicate that more than half of the participants, who had poor academic performances, from each of the locations were at risk of

dyslexia according to the diagnosis through DEST-2(Figure 4 and 5).More participants from Dhaka City were being at risk of dyslexia than Rajshahi and Chittagong. Therefore, from the findings it can be said that participants who had poor academic performances might have more chance of being at risk of dyslexia. Karande, Doshi, Thadhani and Sholapurwala (2013) found similar result in a study on the etiology of poor school performance in children assessed at a learning disability clinic in western India over 12 months. Specific learning disabilities (dyslexia, dysgraphia and dyscalculia) were found to be the commonest cause of poor school performances.

However, the above findings may give an indication that being at risk of dyslexia or having dyslexia might be a reason behind the academic poor performances or failure in the examination and later drop out from education which is still unknown and uncommon to most of the people in Bangladesh. Early identification may have a great effort to intervene early and help those children of our country to ensure their early childhood development and later education and learning by decreasing failure and drop out from school. In doing so, the necessity to develop screening test and diagnosing tools are very crucial for our country. We don't have any assessment tool standardized according to Bangladeshi norm to measure dyslexia. Therefore, this is the high time to diagnose the true nature of this problem so that appropriate intervention and support can be given to our children.

An interesting aspect was found from the findings of the main study (table 23, 24 and 25) that participants of three of the cities scored below or well below average in the same subtests (Rhyme Detection/First Letter, Forward Digit Span, Sound Order, Corsi Frog and Vocabulary tests) except one (Phonological Discrimination) where only the participants of Chittagong scored below average. In fact, the performances of the participants from Dhaka, Rajshahi and Chittagong in the subtests of DEST-2 indicates partly the nature and problem of dyslexia among

the young children of Bangladesh. The 'double deficit' hypothesis indicates that dyslexic people can have difficulties with both phonological processing and naming speed (Wolf,1996; Wolf and Brien, 2001).Also The well established 'phonological deficit hypothesis' holds that children suffer from some early problem in phonological skill and it is phonological skills that causes subsequent reading problems. Although dyslexia can manifest itself in many ways there may be a single cause -a phonological deficit as the 'proximal cause of dyslexia (Snowling, 2000).

To understand the nature and problem of dyslexia among the young children of Bangladesh, three cases per each city were being studied in an in-depth way. The participants from Dhaka, Rajshahi and Chittagong were represented as Case I; Case II and Case III respectively (table 26 and 27).

Case 1 had an At Risk Quotient (ARQ) of 1, which indicates strongly at risk level of dyslexia. He was a second born boy of 6 years 5 months from an English medium school of Dhaka city. There were 5 tests at (--), 2 tests at (-) which were sufficient enough to indicate at risk level of dyslexia. The ARQ gave a quantitative score with 2 points for each of the 5 (--), and 1 for each of the 2(-), giving a total of 12 (C) and an ARQ of 1 (D) (score sheet of case I attached in appendices). According to the DEST-2 manual, 0.9 indicates strong risk. The profile diagram for this child (Figure 6) indicated severe difficulties on several of the diagnosis tests: Rapid Naming, Phonological Discrimination, Rhyme /First Letter, Forwards Digit Span, Sound Order and Corsi Frog. All these difficulties appeared to be consistent with impaired phonological skills and working memory. By contrast, there was relatively good performance on vocabulary where most of the participants of main study did poor. In addition to the performance in DEST-2, it is mentioned that class teacher referred him as a very poor performer in the class as he was a repeater due to poor performances in the last academic session first of all. Secondly, he had

problems in reading and writing, used to get confused with alphabet and words, took much time to complete class work specially the written work. He required continuous individual guidance in school. Special classes were arranged in school based on his needs where one to one attention was given. The researcher found that he took much time to understand the instruction of DEST-2 Subtests and in certain subtests he didn't understand that specially phonological discrimination and Rhyme detection/first letter.

Case 2 had an At Risk Quotient (ARQ) of 0.92, which indicates strongly at risk level of dyslexia. She was a first born of 6 years 2 months of age from an English medium school of Rajshahi city. There were 5 tests at (--), 1 tests at (-) which were sufficient enough to indicate at risk level of dyslexia (score sheet of case II attached in appendices). According to the DEST-2 manual, 0.9 indicates strong risk. The profile diagram for this child (Figure 6) indicated severe difficulties on several of the diagnosis tests: Rapid Naming, Phonological Discrimination, Rhyme /First Letter, Forwards Digit Span, Sound Order and Vocabulary. All these difficulties appeared to be consistent with impaired phonological skills and working memory. In addition to the performance in DEST-2, it is mentioned that class teacher referred her as a very poor performer in the class as she was slow in grasping concepts and also slow in writing both in Bangla and English. She also required continuous individual guidance in school as like case I. The researcher also observed that she was having problem in understanding the instruction in English and the researcher had to tell very slowly.

Case 3 had an At Risk Quotient (ARQ) of 0.92, which indicates strongly at risk level of dyslexia. She was a first born of 6 years 1 month of age from an English medium school of Chittagong city. There were 5 tests at (--), 1 tests at (-) which were sufficient enough to indicate at risk level of dyslexia (score sheet of case II attached in appendices). According to the DEST-2 manual, 0.9

indicates strong risk. The profile diagram for this child (Figure 6) indicated severe difficulties on several of the diagnosis tests: Rapid Naming, Phonological Discrimination, Rhyme /First Letter, Forwards Digit Span, Corsi Frog and Vocabulary. In addition to the performance in DEST-2, it is mentioned that class teacher referred her as a very poor performer in the class as she used to spell incorrectly both in Bangla and English Language and remained inattentive and absent minded in the class. She also required continuous individual guidance in school as like other two cases.

From analyzing the three cases described above it can be said that children having at risk of dyslexia had problems in phonological skills, fluency in performances, working memory and also visual working memory, receptive vocabulary which were manifested as problems in reading, writing, spelling, receptive languages, slow performances etc. These findings from the case studies were validated by the findings about dyslexia by the US Orton Society where dyslexia was being characterized by difficulties in receptive and expressive language, including phonological processing, in reading, writing, spelling, handwriting and sometimes in arithmetic (Orton Society, 1995).

The nature and problems of dyslexia among young children of Bangladesh were also depicted through the comments of the teachers (table 28) from Dhaka, Rajshai and Chittagong Cities which were very relevant with the findings from the DEST-2 screening of participants specially the three particular cases described above. Besides, it was seen from the respond of the teachers that most of them knew the term dyslexia and they came to know it from an Indian Movie 'Taare Jameen Par'. They suggested one to one intervention, auditory learning, and learning through demonstration or hand on activity, play and music for the children with at risk level of dyslexia in Bangladesh. Some of the teachers also felt the necessity of special training to handle students

with at risk of dyslexia and also to appoint professionals specially Educational Psychologist in schools of Bangladesh.

Limitations of the Present Study:

i)The sample size was small to represent the population of Bangladesh and the sample was not randomly selected.

ii)The academic performances of the participants of pilot study was not collected in a objective manner i.e. from report card or teachers' comments; only parents' comments were taken in this regard.

iii)The DEST-2 was not a standardized tool for screening dyslexia in Bangladeshi children. Therefore, based on the diagnosis through DEST-2, conclusion about Bangladeshi children wouldn't be appropriate in all cases. It may only give a probable idea about the at risk level of dyslexia among the young children of Bangladesh.

iv)The data were only analyzed through using Pearson Chi-Square.Any other rigorous data analysis method could have give an exact picture of the data collected from present study.

However, the findings from the present study may give some insights to the teachers, parents, educators, psychologists in different areas specially educational psychologists and other professionals about the nature and problem of dyslexia and may initiate further study in this particular area for creating tools to assess and develop intervention program to support the children of Bangladesh who need help.

REFERENCES

Badian, N. A. (1997) Dyslexia and the double deficit hypothesis. Annals of Dyslexia, 47, 69–87.

Bradford, J. (2013). Dyslexia and Stress. Dyslexia Online Magazine. Retrieved from: http://www.dyslexia-parent.com/magazine.html

British Dyslexia Association (2007). Dyslexia Research Information: BDA Definition of Dyslexia. Retrieved from: http://www.bdadyslexia.org.uk/about-dyslexia/further-information/dyslexia-research-information-.html

British Dyslexia Association (2009). Dyslexia Research Information: BDA Definition of Dyslexia. The Dyslexia Handbook 1996, p11-14. Retrieved from : http://www.bdadyslexia.org.uk/about-dyslexia/further-information/dyslexia-research-information-.html

Britto, P. R. ,Boller,K.,Yoshikawa, H. (2011).Social Policy Report. Quality of Early Childhood Development Programs in Global Contexts:Rationale for Investment, Conceptual Framework and Implications for Equity. sharing child and youth development knowledge,25(2).

British Psychological Society (1999). Dyslexia, Literacy and Psychological Assessment.Working Party Report, Division of Educational and Child Psychology. BPS Leicester. pp. 18.

Burden, B. (2002). A cognitive approach to dyslexia: Learning styles and thinking skills. In: G. Reid and J. Wearmouth (eds), Dyslexia and Literacy, Theory and Practice. Chichester, John Wiley & Sons.

Castles, A., Datta,H., Gayan,J., and Olson,R.K. (1999). Varieties of developemental reading disorder: Genetic and environmental influences. Journal of Experimental Child Psychology, 72, 73

Deacon, S. H., Parrila, R. and Kirby, J. R. (2008). A review of the evidence on morphological processing in dyslexics and poor readers: A strength or weakness? In: G. Reid, A. Fawcett, F. Manis and L. Siegel (eds), The Sage Dyslexia Handbook. London, Sage.

Department for Education and Employment, UK (1994). Code of Practice on the Identification and Assessment of Special Educational Needs. ISBN 0 85522 444 4 HMSO.

Fawcett, A. J. and Nicolson, R.I. (2004). The Dyslexia Early Screening Test, Second Edition.Manual.The Psychological Corporation, 32 Jamestown Road,London NW1 7BY.

Fawcett, A. J. and Nicolson, R. (2008). Dyslexia and the cerebellum. In: G. Reid, A. Fawcett, F. Manis and L. Siegel (eds), The Sage Dyslexia Handbook. London, Sage.

Fawcett A. J. & Nicolson R. I. (2010). Performance of Dyslexic Children on Cerebellar and Cognitive Tests. Journal of Motor Behavior, 31(1). Retrieved from: http://www.tandfonline.com/doi/abs/10.1080/00222899909601892#.UqB0adIW1Hs

Fawcett A. J. & Nicolson R. I. (2011). Developmental Dyslexia: The cerebellar Deficit Hypothesis. Trends in Neurosciences.24(9).pp 508-511. Retrieved from: http://www.sciencedirect.com/science/article/pii/S0166223600018968

Filmer, D. (2005) Disability, Poverty, and Schooling in Developing Countries: Results from 11 Household Surveys. Washington DC: World Bank.

Fisher, S.E., Marlow, A.J., Lamb, J., Maestrini, E., Williams, D.F., Richardson , A.J., Weeks, D.E., Stein, J.F., and Monaco, A,P., (1999). A quantitative-trait locus on chromosome 6p influences different aspects of developemental dyslexia. American Journal of Human Genetics, 64, 146-56

Fitch, R. H., Miller, S. and Tallal, P. (1997) Neurobiology of speech perception. Annual Review of Neuroscience, 20, 331–353.

Freud, J. (2009) Dyslexia Assessment.Retrived from : http://www.dyslexia-teacher.com/t9.html (accessed on 05/01/13)

Friel-Palti, S. and Finitzo, T. (1990). Language learning in a prospective study of otitis media with effusion in the first two years of life. Journal of Speech and Hearing Research, 33 , 188–194.

Frith, U. (2002). Resolving the paradoxes of dyslexia. In: G. Reid and J. Wearmouth (eds), Dyslexia and Literacy, Theory and Practice. Chichester, John Wiley & Sons.

Galaburda, A. M. and Rosen, G. D. (2001).Neural plasticity in dyslexia: A window to mechanisms of learning disabilities. In: J. L. McClelland and R. S. Siegler (eds), Mechanisms ….of Cognitive Development: Behavioral and Neural Perspectives (pp. 307–323). Mahwah, NJ, Lawrence Erlbaum.

Gallagher, A., Frith,U., and Snowling,M.J., (2000). Precursors of literacy-delay among children at genetic risk of dyslexia. Journal of Child Psychology and Psychiatry, 41, 203-13

Geschwind, N. and Galaburda, A. (1985) Cerebral lateralisation biological mechanisms associations and pathology: A hypothesis and a programme for research. Archives of Neurology, 42, 428–459.

Government of Bangladesh, GoB (2009) Bangladesh Primary Education Annual Sector Performance Report, Directorate of Primary Education, Second Primary Education Development program.

Gravel, J. S. and Wallace, I. F. (1995) Early otitis media, auditory abilities and educational risk. American Journal of Speech-Language Pathology, 4, 89–94.

Gilger, J.W., Pennington,B.F., and DeFries,J.C. (1991) Risk for reading disability as a function of parental history in three families studies. Reading and Writing, 3, 205-18

Harrison, A. G., Nichols, E. (2005). A Validation of the Dyslexia Adult Screening Test (DAST) in a Post-Secondary Population. Retrieved from: http://eric.ed.gov/?id=EJ723255

Haque, M. and Anwar, S. (2007). Diagnosing Dyslexia among Young Children. Unpublished Manuscript, Department of Psychology, University of Dhaka.

Haque,M. and Samia I. (2008). Piloting DEST-2 to Identify Dyslexia among Young Children. Unpublished Manuscript, Department of Psychology, University of Dhaka.

International Dyslexia Association (2002). Dyslexia Definition. Available online: http://www.region10.org/Dyslexia/definition.html.

International Dyslexia Association (2010).How is dyslexia assessed? Retrieved from: http://dyslexiaassociation.org.au/index.php?page=how-is-dyslexia-assessed

Lewin, K.M. (2007) Improving Access, Equity and Transitions in Education: Creating a Research Agenda, CREATE Pathways to Access, Research Monograph No 1. Brighton University of Sussex.

Melby-Lervåg M., Lyster S. A., Hulme C. (2012). Phonological skills and their role in learning to read: A meta-analytic review. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/22250824

National Audit Office (2010) Bilateral Support to Primary Education, Department of International Development, Report by the comptroller and Auditor General, HC 69, Session 2010-2011.

Karande S.,Doshi B.,Thadhani A. and Sholapurwala R. (2013). Profile of children with poor school performance in Mumbai. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/23665607

Knight, D. F. and Hynd, G. W. (2002) The neurobiology of dyslexia. In: G. Reid and J. Wearmouth (eds), Dyslexia and Literacy, Theory and Practice. Chichester, John Wiley & Sons.

Leikin, M. and Zur Hagit, E. (2006) Morphological processing in adult dyslexia. Journal of Psycholinguistic Research, 35, 471–490.

Morgan, D. (2012) The seven causes of reading difficulty for dyslexics. Dyslexia online magazine.Retrieve from : http://www.dyslexia-parent.com/mag64.html

Mogasale V.V., Patil V.D., Patil N.M., and Mogasale V. (2013). Prevalence of specific learning disabilities among primary school children in a South Indian city. Indian Journal of Pediatrics 80(5):439-40. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/21887581

Olson,R.K., Forsberg,H, Wise, B. and Rack, J.(1994) Measurement of word recognition, orthographic, and phonological skills. In G.R. Lyon(ed), Frames of Reference for the assessment of Learning Disabilities: New Views on Measurement Issues, Baltimore, MD: Paul H. Brookes Publishing Co., 243-77

Orton, S.T. (1925). "Specific reading disability—strephosymbolia". Journal of the American Medical Association, 90 (14): 1095–1099.

Orton Society (1995). Definition of Dyslexia;report from committee of members. *Perspectives, .21, 16-17.*

Park J. & Lombardino L. J. (2012). A comparison of phonological processing skills of children with mild to moderate sensorineural hearing loss and children with dyslexia. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/22978204

Peer, L. (2005). Glue Ear. London: David Fulton.

Peer, L. (2009). Dyslexia and glue ear: A sticky educational problem. In: G. Reid (ed.), The Routledge Dyslexia Companion. London, Routledge.

Ptok M., Berendes K., Gottal S., Grabherr B., Schneeberg J., Wittler M.(2007). Developmental dyslexia: the role of phonological processing for the development of literacy. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17694291

Pumfrey, P. & Reason, R. (1991).Specific Learning Difficulties (Dyslexia): Challenges and Responses. London: Routledge.

Reid G. (2009). Defining Dyslexia. Dyslexia: A practitioner's Handbook (4th edition). pp. 4. Wiley- Blackwell.

Snowling, M.J. (2000) Dyslexia (2nd.Edition) Blackwell Publishers, Oxford. U.K.

Tunmer, W. E. and Chapman, J. (1996). A developmental model of dyslexia. Can the construct be saved? Dyslexia, 2(3), 179–89.

UNICEF (2010), Bangladesh Statistics [online]. Retrieved from: http://www.unicef.org/infobycountry/bangladesh_bangladesh_statistics.html

United Nations. (2000). United Nations millennium declaration. New York, NY: Author

United Nations Educational, Scientific and Cultural Organization. (2000). Education for All 2000 Assessment. Paris, France: Author.

University of Kansas (2009). Gene Associated With Language, Speech And Reading Disorders Identified. Science Daily. Retrieved from http://www.sciencedaily.com/releases/2009/08/090827123319.htm

Wolf, M. (1996). The double-deficit hypothesis for the developmental dyslexics. Paper read at the 47th Annual Conference of the Orton Dyslexia Society, November 1996, Boston.

Wolf, M. and O'Brien, B. (2001). On issues of time, fluency and intervention. In: A. Fawcett (ed.), Dyslexia, Theory and Good Practice. London.

World Bank. (2010). World development indicators 2009. Washington, DC: Author. Zeffiro, T. and Eden, G. (2000). The neural basis of developmental dyslexia. Annals of Dyslexia, 50, 3–30.s

Appendices

List of Appendices

1. **Permission letter from school**

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