CHAPTER I

INTRODUCTION

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CHAPTER – I

INTRODUCTION

“If I have ever made any valuable discoveries, it has been owing more to patient attention than to any other talent.”

- Isaac Newton

Attention is one of the important factors in the process of learning and is one of the dimensions of individual differences. It has assumed a special significance in educational context and many authorities believe that the variability in students’ performance and result are not merely due to discrepancies in intelligence but also due to different “attention spans”. Attention has been defined as the ability to be aware of stimuli, including internal and external stimuli (Van Zomeren & Brouwer, 1994). Persons who find difficulty in paying attention to the tasks in hand are said to have attentional problems. Lack of attention or missing attention or interruption in the process of paying attention can be termed as attention deficit. According to Lyndal M. Bullock (1992), throughout the history of learning disabilities, attentional deficits have been implicated as a primary source of the disability. Hallahan & Kauffman (1988), Hallahan & Reeve (1980), and Lerner (1989) used attentional deficits or inattentive behaviour as characteristics to identify individuals with learning disabilities. Attention deficit can be considered as one of the reasons for academic and school difficulties among adolescents and a powerful predictor of their mental health problems. WHO estimate shows that up to 20% adolescents have one or more mental or behavioural problems (World Health Report, 2001). Studies conducted in different parts of the world show that prevalence of behavioural and emotional problems in adolescents ranges from 16.5% (Robert, Atkinson & Rosenblatt, 1998) to 40.8% (Jensonm et al., 1995) and in
India it is in the range of 13.7% (Mishra & Sharma, 2001) to 50% (Belfer, 2005). Adolescents form one fifth of India’s population (IIPS & Macrointernational, 2007), which suggests that these problems burden the society substantially. The disorder named ‘Attention Deficit Hyperactivity Disorder’ (ADHD) is adding to this burden significantly.

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed psychiatric disorders of childhood with an estimated prevalence rate of 3-7% among school-age children (American Psychiatric Association, 2000). Of those, up to 70% will continue to have symptoms in adolescence (Weiss & Hechtman, 1993). Adolescents with ADHD have a greater risk of impaired school performance, less participation in extracurricular activities, increased potential for the incidence of juvenile delinquency and difficulty in social relationships (Barkley, Fisher, Edelbrock & Smallish, 1993; Klein & Manuzza, 1991). The prevalence of ADHD and its effects on adolescents present a challenge for health care professionals, educators, counselors and parents (Wiggins, 2001)

ADHD is a neuro-behavioural disorder characterized by “inattention, and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development” (American Psychiatric Association [APA], 1994). Over the past few decades, the terminology, diagnostic criteria and etiology of the constellation of symptoms that include inattention, hyperactivity and impulsivity have undergone various changes (Sidel, 2007).
1.1 A BRIEF HISTORY OF ATTENTION DEFICIT HYPERACTIVITY DISORDER (ADHD)

Early in the 20\textsuperscript{th} century, children who demonstrated aggressive, defiant and lawless behaviour, including insensitivity to punishment, were described as having deficits in inhibitory volition, moral control and sustained attention, which were believed to relate to an underlying neurological deficiency (Barkley, 1998).

Following an outbreak of encephalitis in 1917, several clinicians noted that children who survived the disease exhibited problems with attention, impulsivity and difficulty in controlling their behaviour. They also had problems with cognitive abilities. The syndrome was called Post-Encephalitic Behaviour Disorder and was clearly the result of brain damage. This led others to look for possible causes of brain damage such as birth injury, measles, epilepsy and head injury that might account for ADHD type behaviours (Barkley, 1998).

In the 1930s, some investigators noted the similarity between the behaviour of hyperactive children and primates with frontal lobe damage. Milder forms of hyperactivity were attributed to child-rearing practices that led to spoiling the child. Others were attributed to poor and chaotic family environments. This trend of thought resurfaces periodically (Barkley, 1998).

Many in the 1940s became convinced that the triad of symptoms was definitely the result of some type of brain injury even though little or no evidence of damage could be found. The syndrome became known as Minimal Brain Dysfunction (MBD). The concept of MBD continued into the early 1960s.
In the late 1960’s, features of childhood hyperactivity made their way into the Diagnostic and Statistical Manual of Mental Disorders (DSM-II) (Sidel, 2007). In DSM II, the motor symptoms of the disorder were emphasized and it was referred to as Hyperkinetic Reaction of Childhood characterized by “over-activity, restlessness, distractibility and short attention span” (APA, 1968).

In the 1970’s, the profile of this disorder began to closely resemble the symptom profile associated with ADHD today. During this time, researchers and clinicians began to focus on deficits in sustained attention and impulse control, in addition to hyperactivity (Barkley, 1998).

In the late 1970’s and early 1980’s, this clinical profile became even more refined, highlighting deficits in attention, behavioural inhibition, the ability to modulate one’s arousal level and a strong need for immediate reinforcement (Barkley, 1998). In DSM III, the inattention symptoms of the disorder were emphasized and the disorder changed names to reflect the new emphasis and became known as Attention Deficit Disorder (ADD), with or without hyperactivity (APA, 1980). This marked an important change in the conceptualization of the disorder, with attention and impulsivity considered to be the defining characteristics and hyperactivity a possible but not required feature. However, less than a decade later, hyperactivity became more prominent (Sidel, 2007).

The next diagnostic manual, DSM III-R, reverted to a diagnosis with no distinction between the hyperactivity and inattention dimensions and the disorder was called Attention Deficit Hyperactivity Disorder (APA, 1987).
In the current version of the DSM, the disorder is still referred to as ADHD, but it now has three sub-types: Predominantly Inattentive Type, Predominantly Hyperactive-Impulsive Type, and Combined Type (APA, 2000).

1.2 BASIC SUB-TYPES OF ADHD

Research consistently demonstrated that ADHD was not a unitary construct as implied in DSM III-R. A review of the factor analytic studies of ADHD revealed two separate dimensions of ADHD, one composed of inattention symptoms and one composed of hyperactivity and impulsivity symptoms (Lahey et al, 1994). This led to their specifications in the diagnostic manuals, the DSM-IV and DSM-IV-TR (APA, 1994, 2000, respectively). The DSM-IV ADHD Sub-types have been shown to be valid based on various behavioural correlates (Gaub & Carlson, 1997a; McBurnett et al., 1999). The DSM-IV field trials supported the validity of the ADHD sub-types (Lahey et al., 1994). The DSM-IV has been shown to increase the frequency of an ADHD diagnosis compared to the DSM-III-R, and is superior to the DSM-III-R in subtyping accuracy (McBurnett et al., 1999). In the DSM-IV system, three sub-types of ADHD have been identified:

i) Predominantly Inattentive

ii) Predominantly Hyperactive/Impulsive, and

iii) Combined Type which has elements of both dimensions.

The Inattentive sub-type of ADHD constitutes the majority of ADHD diagnoses, while the Hyperactive/Impulsive sub-type constitutes the least (Wolraich, Hannah, Pinnock, Baumgaertel & Brown, 1996). The Inattentive sub-type presents with more passive inattention, less hyperactivity and aggression, and more anxiety and depression than the
other sub-types (Berry, Shaywitz, & Shaywitz, 1985; Faraone, Biederman, Weber & Russell, 1998; Willcutt, Pennington, Chhabildas, Friedman & Alexander, 1999). Also, it manifests slightly later in life, or is at least noticed later, is more often diagnosed in females than in males (Faraone et al., 2000; Nolan, Gadow & Sprafkin, 2001), and is present more often in community samples than in clinic samples (Milich, Balentine & Lynam, 2001; Nolan et al., 2001).

Inattentive symptoms are more persistent than the hyperactive/impulsive and may last into adulthood. It may be, therefore, said that the hyperactive/impulsive type shows gradual reduction of prevalence as children go through adolescence and into adulthood (Bever, 2005). Although all sub-types present a high rate of learning disorders, the inattentive sub-type appears to more often involve a math disorder of some type (Marshall, Hynd, Handwerk & Hall, 1997; Marshall, Schafer, O’Donnell, Elliott & Handwerk, 1999; Morgan, Hynd, Riccio & Hall, 1996). Further, there is some evidence that the inattentive sub-type differs in brain areas affected and may involve more spatial deficits than the other sub-types (Garcia-Sanchez, Estevez-Gonzalez, Suarez-Romero & Junque, 1997; Hynd, Semrud-Clikeman, Lorys, Novey & Eliopulos, 1990).

Investigators have found so many differences between the Inattentive sub-type and the other two sub-types, i.e., the Hyperactive-Impulsive and the Combined, that some believe the Inattentive sub-type is not really an ADHD sub-type, but is, rather, a separate disorder (Barkley, 2001; Milich, et al., 2001).

ADHD sub-types may also differ in terms of having difficulty with sustained or selective types of attention. Selective attention is attending to information for a relatively brief amount of time and includes both
focused and divided attention (Halperin, 1991). Sustained attention is the ability to maintain an effective attention span over an extended period of time; it involves the ability to maintain a consistent behavioural response during continuous and repetitive activity and is due to neural activity that is both enhanced in the attending channel and inhibited in the non-attending channel. Sustained attention may be: (a) self-regulated and internally controlled (characteristic of the combined and hyperactive sub-types), or (b) contingency-shaped and externally controlled (Barkley, 1997).

Although both the hyperactive and inattentive sub-types exhibit difficulty with sustained attention and automatic shifts or sensory filtering, the hyperactive sub-type may have more difficulty with sustained attention and the inattentive sub-type may have more difficulty with selective or focused attention (Cohen, 1993).

### 1.3 CAUSES AND DIAGNOSIS OF ADHD

Research to find a cause for ADHD and an objective diagnostic tool seem to be linked (Bitar, 2004). The exact causes of ADHD remain elusive, but research indicates that at least three separate yet interactive brain regions have been associated with the condition (National Resource Center on AD/HD, 2010). Many brain research studies used various objective diagnostic tools and techniques to diagnose the brain related morphological and physiological deviations in the individuals with ADHD. These techniques include positron-emission tomography (PET) (Zametkin et al., 1990), single-photon emission computed tomography (SPECT) (Seig, Gaffney, Preston & Hellings, 1995), magnetic resonance imaging (MRI) (Hynd, et al., 1990), quantitative electroencephalography (QEEG) (Kuperman, Johnson, Arndt, Lindgren & Wolraich, 1996), and
functional electroencephalography (EEG) (Baving, Laucht & Schmidt, 1999; Silberstein et al., 1998).

Various neuroimaging and electroencephalography studies have used forms of continuous performance task (CPT) (Monastra et al., 1999; Silberstein et al., 1998) which use computer to test an individual’s attention to stimulate the frontal areas of the brain. Some practitioners use it as an objective diagnostic tool for ADHD since its development as a research tool. However, its sensitivity to the diagnosis of ADHD has not been validated (Baron & Swanson, 1996; Ruccio & Reynolds, 2001).

Neurotransmitter research has looked at both the brain and genetics (Bitar, 2004). A strong linkage to the dopamine system and the indication that ADHD is a heritable disorder (Sunohara et al., 2000; Thapar, Holmes, Poulton & Harrington, 1999) led to genetic research that looked at dopamine receptor genes. Many studies have shown that ADHD subjects have an increase in the 7-fold repeat form of the dopamine receptor D4 (DRD4) gene (Barr, 2001; LaHoste et al., 1996; Sunohara et al., 2000). The DRD4 gene has been associated with an increase in novelty-seeking behaviour which could also be related to the impulsivity of ADHD (LaHoste et al., 1996).

ADHD is a complex trait and complex traits are typically the result of multiple interacting genes. Problems in parenting or life situations may make ADHD better or worse, but they do not cause the disorder (National Resource Center on AD/HD, 2010).

A review of 11 years of neurobiological ADHD research, looking for a cause of ADHD, has revealed many clues to the cause of the disorder, but nothing conclusive has been determined (Bitar, 2004). Until an objective means of determining the cause and diagnosis of ADHD is
found, subjective means currently in use to describe behavioural symptoms will continue to be used. These methods include the DSM-IV-TR diagnostic guidelines, psychological testing, parent rating, teacher evaluation, classroom observation, diagnostic interview, physician history and physical examination (Anastopoulos, 1999; McGough & McCracken, 2000; Zametkin & Ernst, 1999). Because of the potential bias inherent in these methods, data from several sources are needed to make a diagnosis. A diagnosis can be made as early as 3 years of age and behavioural symptoms always must be compared with appropriate behaviour for persons of the same age and developmental level (Zametkin & Ernst, 1999).

1.4 RATIONALE OF THE STUDY

Success of teaching – learning process is generally measured in terms of learning outcomes of the learners which in turn depend on many factors and attention is one of the most important of them. A frequently faced problem by the teacher in the classroom is the problem of lack of attention or missing attention of the students to a particular task. These attentional problems may have their origin in the various psychological disorders; the prominent one of these is Attention Deficit Hyperactivity Disorder (ADHD). Knowledge of ADHD, thus, becomes imperative particularly for human resources dealing with education of these students.

The need for research can also be gauged from the consequences of ADHD in absence of its early identification and appropriate treatment; these include school failure and drop out, depression, conduct disorder, failed relationships, underachievement in the workplace and substance abuse. When appropriately treated, persons with ADHD can lead
productive and satisfying lives. (National Resource Center on AD/HD, 2010).

Besides the symptoms of inattention, hyperactivity and impulsiveness, the ADHD child’s motor ability is frequently significantly lower than would be expected of his age and level of intellectual functioning (APA, 2000; Meyer & Sagvolden, 2006). Children with ADHD who experience motor problems often display deficits in requiring complex coordinations of movement, such as handwriting (Barkley, 1998; Schoemaker, Ketelaars, van Zonneveld, Minderaa & Mulder, 2005). These problems may interfere with the ADHD child’s daily functioning and influence their academic performance (Jongmans, Smits-Engelsman & Schoemaker, 2003). Underachievement in school may lead to feelings of inferiority and a lowering of motivation (Weiss & Hechtman, 1993). Other associated features that might be witnessed are low frustration tolerance, temper outbursts, bossiness, stubbornness and mood lability (APA, 1994). Barkley (1998), in his summary of the literature, noted that children with ADHD do evidence some difficulties with emotional self-control, such as greater emotional reactivity in social situations, greater negative effect in peer interactions and greater verbal intonation with mothers. Some results do suggest that the hostile or defiant behavior sometimes associated with ADHD may be due to emotional self-regulation difficulties (Volk-Stowell, 2004).

The hyperactive adolescents have a substantially higher risk for difficulties in many areas, such as social, academic, legal, psychiatric and family (Barkley, 1998). Hyperactive adolescents are more likely to be in a car accident, with them being at fault more often, and they have a higher incidence of traffic citations. In addition, 30% to 58% have failed a grade in school (Barkley, 1998). School dropout rates for the ADHD
adolescent are five times that of general population and institutionalization rates are as high as 20 times greater (Spreen, Risser & Edgell, 1995).

It is estimated that health care for a child with ADHD is $1150.65 per child per year. This estimate does not include the costs for school expenses such as school nurse care, psychologists, counseling and special education teachers (Bitar, 2004). Also not included are the expenses for incarceration and inpatient mental health care (Chan, Zhan & Homer, 2002).

The cost inherent in undiagnosed ADHD is also manifold. In 2000, cost in USA in terms of dollars was estimated to be $31.6 billion. Estimation included costs related to healthcare for the patient and family members, as well as the loss of work days by both adult patients and care-givers of ADHD patients (Birnbaum, et al 2005). The economic cost may currently be even higher. The economic burden does not take into account the emotional cost to both patient and family members (Payne, 2008). Individuals with non-diagnosed ADHD often have severe functional and psycho-social impairment and associated poor quality of life. Undiagnosed adults have significantly higher rates of depression, drinking problem, lower educational attainment and interpersonal problems (Able, Johnston, Adler & Swindle, 2007).

The enormous impact of ADHD on society in terms of financial cost, stress to families, interference with academic and vocational activities, negative effects on self-esteem, motor vehicle accidents, drug and alcohol abuse, anti-social and destructive behaviours etc., has been well documented in studies in the US. But various studies from around the world suggest that as ADHD is at least as high in many non-US children,
similar burden of illness would be expected elsewhere also including India (Climb Up).

Although ADHD is considered a disorder, some view it in a positive light as well. There has been little research into the intellectual advantages offered by the disorder and also into the conditions which help in taking advantage of ADHD traits. Many researchers suggest that the unique brain wiring of ADHD individuals may equip them with the ability to think outside the box, solve complex mathematical puzzles and invent new forms of art, music and films. From presidents and inventors to artists and musicians, many famous people with adult ADHD succeeded beyond their wildest dreams (Jacobs & Wendel, 2010).

ADHD is now being found to be increasingly afflicting young children and school students in India. Professionals in the country are diagnosing and treating a large number of cases of ADHD now a days. But still there is very little awareness in India about the disorder and there is an acute need for research about the condition so as to make information available not only to the parents of those afflicted with ADHD, but even to mainstream school teachers and educational planners. Research about ADHD in the context of education is sparse in India and is mainly confined to pre-adolescents. The area of comparative study of prevalence of different sub-types of ADHD among adolescent boys and girls and also among adolescents with high and low intelligence has not been explored much.

The present study aimed at gaining greater understanding of ADHD among adolescent students in relation to gender and intelligence which can be used to advantage in designing of appropriate educational programmes and creating effective teaching – learning environment for
the adolescents belonging to different genders and intelligence level who are diagnosed with ADHD of various sub-types.

1.5 STATEMENT OF THE PROBLEM

“A STUDY OF ATTENTION DEFICIT HYPERACTIVITY DISORDER AMONG ADOLESCENT STUDENTS IN RELATION TO GENDER AND INTELLIGENCE.”

1.6 OPERATIONAL DEFINITIONS OF THE KEY TERMS USED

The key terms of the study have been operationally defined as under:

1.6.1 Attention Deficit Hyperactivity Disorder (ADHD)

Attention Deficit Hyperactivity Disorder (ADHD) is a developmental and neurological disorder, present from childhood, which is characterized by developmentally inappropriate levels of inattention and/or hyperactive – impulsive behaviour (Coleman & Levine, 1988; Murphy & Hagerman, 1992).

In the proposed study, ADHD was operationally defined as the disorder diagnosed by the ADHD Rating Scale – IV developed by DuPaul, Power, Anastopoulos and Reid in 1998 (Appendices B & C) based on the globally accepted symptoms listed in the criteria for ADHD in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) published by American Psychiatric Association (Appendix D). The rating scale was adapted to Indian conditions by the researcher by making it bilingual with the inclusion of Hindi translation of the English items.
1.6.2 Adolescent Students

In the present study, the term adolescent students referred to the school students reaching at the threshold of puberty, identified to be in the age group of 13 to 16 years studying in IX and X standards.

1.6.3 Intelligence

Intelligence here meant cognitive or mental ability of the individual as assessed in terms of I.Q. scores obtained in the Group Test of General Mental Ability developed and revised by Dr. S. Jalota in Hindi (Appendix A).

1.7 OBJECTIVES OF THE STUDY

The research study was aimed at getting better insight about the prevalence of various sub-types of Attention Deficit Hyperactivity Disorder (ADHD) among adolescent students and to study whether the gender and intelligence have any relationship with occurrence of this disorder. Following were the major objectives of the present study:

1. To diagnose adolescent students for various sub-types of Attention Deficit Hyperactivity Disorder (ADHD), viz.: ADHD predominantly inattentive type (ADHD-IT), ADHD predominantly hyperactive/impulsive type (ADHD-HI) and ADHD combined type (ADHD-CT).

2. To compare the prevalence of various sub-types of ADHD among adolescent girls and boys.

3. To assess whether the adolescent students with high and low intelligence differ in terms of prevalence of various sub-types of ADHD.
4. To study the interactional effect of gender and intelligence on prevalence of various sub-types of ADHD among adolescent students.

5. To suggest various remedial and supporting techniques which can be adopted by the educationists for the educational betterment of the adolescents diagnosed with ADHD.

1.8 HYPOTHESES OF THE STUDY

Following hypotheses were formulated and tested during the course of the study:

1. There is no significant difference between adolescent Boy and Girl Students in terms of occurrence of ADHD predominantly inattentive type (ADHD-IT).

2. There is no significant difference between adolescent Boy and Girl Students in terms of occurrence of ADHD predominantly hyperactive/impulsive type (ADHD-HI).

3. There is no significant difference between adolescent Boy and Girl Students in terms of occurrence of ADHD combined type (ADHD-CT).

4. There is no significant relationship between I.Q. and occurrence of ADHD predominantly inattentive type (ADHD-IT).

5. There is no significant relationship between I.Q. and occurrence of ADHD predominantly hyperactive/impulsive type (ADHD-HI).

6. There is no significant relationship between I.Q. and occurrence of ADHD combined type (ADHD-CT).
7. (a) Controlling for I.Q., Gender has no significant relationship with occurrence of ADHD predominantly inattention type (ADHD-IT).
(b) Controlling for Gender, I.Q. has no significant relationship with occurrence of ADHD predominantly inattention type (ADHD-IT).

8. (a) Controlling for I.Q., Gender has no significant relationship with occurrence of ADHD predominantly hyperactive/impulsive type (ADHD-HI).
(b) Controlling for Gender, I.Q. has no significant relationship with occurrence of ADHD predominantly hyperactive/impulsive type (ADHD-HI).

9. (a) Controlling for I.Q., Gender has no significant relationship with occurrence of ADHD combined type (ADHD-CT).
(b) Controlling for Gender, I.Q. has no significant relationship with occurrence of ADHD combined type (ADHD-CT).

10. There is no interactional effect of I.Q. and Gender on the occurrence of ADHD predominantly inattention type (ADHD-IT).

11. There is no interactional effect of I.Q. and Gender on the occurrence of ADHD predominantly hyperactive/impulsive type (ADHD-HI).

12. There is no interactional effect of I.Q. and Gender on the occurrence of ADHD combined type (ADHD-CT).
1.9 DELIMITATIONS OF THE STUDY

The present study was delimited in following aspects:

1. The study was confined to the 449 adolescent boys and girls of age group 13 to 16 years studying in IX and X standards in three co-education schools of Pathankot, a northern city of Punjab state of India.

2. ADHD was studied in relation to two variables – gender & intelligence for the above stated subjects.