



## Demographic, Psychological and Medical Characteristics of 1-10 Year-old Children with Autism: A Systematic Review of Archival Records

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### ABSTRACT

*This study is conducted to extract demographic, psychological and medical characteristics of children with autism referred to CTAD. This study is a systematic review based on archival records of 368 children with autism who received rehabilitation services from 2009-2015. The mean age of children was three years and nine months at diagnosis; the samples were 85.3% male and 60.6% were single children. The mean age of fathers was 38 years ranging from 28 to 57 years and the mean age of mothers was 33 years ranging from 21 to 50 years. The highest number of fathers (39.1%) and mothers (45.4%) had bachelor's degree. Moderate autism and mild sensory problems were most prevalent (41% and 53.3%, respectively). Of the children, 84% had no developmental delay, while more than half of them (50.8%) showed signs of hyperactivity. Among all children, only 24.8% underwent EEG which showed no problem in 16.6%. The results of this study can be used to identify the target group (children with autism) and help to formulate plans and policies regarding these children.*

**Keywords:** autism, sensory problems, hyperactivity symptoms, developmental delay

### INTRODUCTION

Autism is a neurodevelopmental disorder with a wide range of symptoms which can be divided into two main categories: impaired communication and social interaction; restricted and repetitive behaviors, interests or activities [1].

The prevalence of autism is rising sharply from one child out of 5000 births in 1975 to one child in every 68 births and one child in every 42 boys in 2014 [2]. According to DSM-V (Diagnostic and statistical manual of mental disorders (5th Ed.)), it is not clear that the increase in prevalence of autism is related to diagnostic criteria of DSM-IV (Diagnostic and statistical manual of mental disorders (4th Ed.)), including subthreshold cases, the increasing awareness of autism, differences in methodologies, or it is a real increase in the prevalence of autism spectrum disorder [1, 3]. Autism is the highest prevalent disorder among developmental disabilities in the United States, accounting for one percent of the total population [2]. In Iran, a study conducted in 3 years on 1300000 children aged 5 years old reported its prevalence as 6.26 per 100000 children [4]. Autism is the most common pervasive developmental disorder [5]. According to a recent study, the rate of diagnosed autism referred to the Center for Treatment of Autistic Disorders(CTAD) has increased four times since 2001 to 2014[6]. In addition, the increased number of autism centers in recent years represents an increased demand for this disorder [7].

With this increase in diagnosis, more attention has been paid to autism and its treatment and prevention by experts in medicine, psychology and neuroscience [8]. This disorder can be found in five continents of the world, in all socio-economic levels and all racial and ethnic groups [9 and 4]. One of the reasons that autism is currently seen between higher socio-economic groups in less developed countries is underdevelopment of health services which is unable to include all members of society [4]. This disorder occurs in boys four times more than girls [1].

Autism symptoms are usually observed in 18-36 months of age [10]; however, these symptoms are generally diagnosed in the second year of life. It is noteworthy that mild symptoms are diagnosed after two years and severe symptoms are diagnosed even before one years of birth [1].

In 2001, research committee of University of San Diego under supervision of the neuroscientist Eric Courchesen tracked measurements of head circumference of 48 preschool age children with autism using their previous records and compared them to the national scale available for head circumference of children in certain ages. The results of this comparison indicate that head circumference of children with autism at birth is smaller than the average specified for infants, while it suddenly grows in the neonatal period, increasing from 25 to 84 percent over a year. The faster growth in this age is associated with more likelihood of injury. Brain volume is 59 for children with mild autism and 95 for children with severe autism. Margaret Bauman believes that abnormal growth is evidence that something wrong is forming in the brains of these children [4].

A number of people with autism can have considerable developmental delay which cannot be seen in normal people; however, most people with autism have average or below average developmental delay and some have developmental delay [4]. The possibility of mental retardation is higher in autistic girls than in boys. Girls without mental problems or language delays may not be recognized by hiding social and communication problems subtly [1].

Another neurodevelopmental disorder in children which has recently attracted the attention of specialists is hyperactivity, accounting for 5% of children. This disorder is characterized by symptoms such as agitation or shaking hands or feet or squirm when sitting, getting up from the chair, running or climbing different places, inability to play sitting and sedentary games [1]. Due to limitations of ICD-10 and replacement of DSM, a subgroup of autism called as... with mental retardation and stereotyped movements cannot be diagnosed in Iran. This may lead to incorrect diagnosis of ADHD in these children [11]. There is a genetic overlap between autism and hyperactivity [12]. A study found a significant relationship between characteristics of autism and diagnosis of hyperactivity in children.

Another problem of children with autism is their unusual way to respond to sensory experiences [14]. Sensory problems can manifest in perception of one or all of the five senses as over-responsiveness or under-responsiveness to input stimuli [15]. People with sensory under-responsiveness use self-stimulation to deal with restrictions on taking stimulants, while people with sensory over-responsiveness avoid overstimulation [16]. Although sensory processing problems exist in the general population and they are not unique to autistic population, a large percentage of children with autism (78--90%) suffer sensory processing problems [17]. According to some studies, the incidence of sensory problems in autism reaches to 95% [18 and 19].

The purpose of this study is to extract demographic information (such as age at diagnosis, gender, age, and parental education, only child) and psychological and medical problems (severity of autism, severity of sensory problems, associated hyperactivity symptoms, developmental delay, and possible problems in EEG) in a number of children with autism.

## **MATERIALS AND METHODS**

The methodology used for this study is qualitative by analysis of archival records of an autism center in Tehran for the past 7 years (2009-2015). These records are related to children with diagnosis of autism by at least one clinical psychologist as well as a child psychiatrist without knowledge of the former diagnosis, receiving rehabilitation services of applied behavior analysis (ABA). Data collected includes age of children, gender, age, and parental education, being only child, severity of autism, severity of sensory problems, developmental delay, symptoms of hyperactivity and potential problems in EEG. Mainly, judgments about intelligence are based on the time of normal sensorimotor development of the child. Moreover, judgments about severity of autism, severity of sensory problems and hyperactivity symptoms are usually based on clinical observations of specialists.

This study is conducted by a systematic review of archival records. The methodology used is analytic and qualitative. Content analysis is used to address the subject.

Content analysis is a method to analyze the occurrence and frequency of certain events or categories in a written or recorded statement. Archival records are used for content analysis, because real-time analysis of these records is difficult. Content analysis requires a systematic review of relational forms with objectively documented patterns and it is more objective than other qualitative methods. This technique should be used in context and background of a clearly developed research. Content analysis is observational in nature; however, its units include a written or visual material or a verbal history rather than a participant behavior. In general, any form of communication through written content (texts, textbooks, novels and newspapers) can be used as raw material of content analysis [20-23].

For holistic and qualitative nature of the study, units are used instead of population. These units include all archival records of CTAD since 2009 to 2015. Archival records and recorded documents give information about a group of people which cannot be observed or recorded by other means. These documents can be divided into two categories [20]:

1) Public records: This record can be obtained inside or outside the environment where the study is conducted. Outside records include important statistics and statistical reports, official records, archives of newspapers and so on. This information is important for comparing groups and communities. Internal records (as the current study) include documents such as student transcripts, computing history, annual reports, budgets, grades, standardized test reports, academic catalogs, official correspondence, etc. This is very important to describe characteristics of an organization and identification of its strengths and weaknesses.

2) Personal records: it is the first-hand evidence of events and experience. These documents include memories, photos, artwork, poems, letters etc. These documents can help researchers understand how a subject sees the world and what he wants to communicate with the audience. The advantage of these resources depends on whether they are available and accurate.

Ethical Considerations: All information collected from participants is kept confidential in order to respect the principle of confidentiality. At the time of assessment and diagnosis, it is explained for the families that the data extracted from records will be used confidentially in the study.

## RESULTS

According to the data extracted from 368 archival records of children with autism, it is revealed that the lowest, highest and mean age of the children referred for diagnosis are 16 months, 10 years and 3 years and 9 months, respectively. The lowest, highest and mean age of fathers is 27, 58 and 38 years, respectively; the lowest, highest and mean age of mothers is 21, 50 and 33.5 years, respectively.

The most frequent age of children is 3 years. Data extracted from 368 records is related to 314 boys (85.3%) and 54 girls (14.7%). Obviously, boys are diagnosed with autism 6 times less than girls. The calculated Chi square shows a significant difference between means of the table.

The data extracted show that the level of education of fathers includes under high school diploma (21), high school diploma (95), associate degree (22), bachelor's degree (144), and master's degree and above (83). The level of education of mothers includes under high school diploma (10), high school diploma (100), associate degree (21), bachelor's degree (167), and master's degree and above (69). The most frequent level of education is bachelor's degree. Out of 368 children, 223 (60.6%) are only child at least at diagnosis. The rest of children have sibling(s). The calculated Chi square shows a significant difference between means of the table.

Severity of autism at diagnosis is classified as mild (123; 33.4%), moderate (151; 41%), and severe (94; 25.5%). Severity of sensory problems at diagnosis is classified as mild (196; 53.3%), moderate (105; 28.5%) and severe (67; 18.2%). Among these children, 309 (84%) show no signs of developmental delay, while 59 (16%) suffer from concurrent developmental delay. The calculated Chi square shows a significant difference between means of the table. More than half of children who were diagnosed with autism (187; 50.8%) show signs of concurrent hyperactivity (from mild to severe) and 181 children (49.2%) show no hyperactivity symptoms. More than three-

quarters of children (277; 75.3%) did not undergo EEG at diagnosis, while more than two-thirds of the rest (61; 16.6%) did not show any problem in EEG. The rest of children (30; 8.2%) showed problems in EEG. Table 1 summarizes above information.

**Table 1: summary of the data extracted from archival records**

		Age (child)		Age (father)		Age (mother)
Lowest		16 months		27 years		21 years
Highest		10 years		58 years		50 years
Mean		3 years and 9 months		38 years		33.5 years
		Boy			Girl	
Diagnosed autism	Frequency	314			54	
	%	85.3%			14.7%	
		Under diploma	Diploma	Associate	Bachelor	Master and above
Father	Frequency	21	95	22	144	83
	%	5.7%	25.8%	6%	39.1%	22.6%
Mother	Frequency	10	100	21	167	69
	%	2.7%	27.2%	5.7%	45.4%	18.8%
		Only child			Multiple child	
Children with autism	Frequency	223			145	
	%	60.6%			39.4%	
		Mild		Moderate		Severe
Severity of autism	Frequency	123		151		94
	%	33.4%		41%		25.5%
		Mild		Moderate		Severe
Severity of sensory problems	Frequency	196		105		67
	%	53.3%		28.5%		18.2%
		Concurrent developmental delay			No concurrent developmental delay	
Autism and developmental delay	Frequency	59			309	
	%	16%			84%	
		Concurrent hyperactivity symptoms			No concurrent hyperactivity symptoms	
Autism and hyperactivity	Frequency	187			181	
	%	50.8%			49.2%	
		Without EEG		Healthy		Problem in EEG
EEG	Frequency	277		61		30
	%	75.3%		16.6%		8.2%

Figure 1 summarizes the data extracted from archival records.

## DISCUSSION

The dramatic rise in the prevalence of autism around the world has increasingly attracted the attention of scientists to this disorder. Autism with highest increase among developmental disorders in USA has led scientists to identify the target group to start the rehabilitative interventions as soon as possible and maximize their effects. A reason that prevalence of autism has been estimated at 1% in Iran is that the studied population included children who had enrolled in the measurement plan of school beginners [4]. Clearly, this population cannot properly represent the prevalence of autism among children, because a number of children with autism do not enroll for the school. This study was a systematic review of 368 archival records of CTAD to extract demographic, medical and psychological characteristics of children with autism to identify the target group.

Consideration of autism and subsequently the increased social awareness in relation to this disorder has led to early referral of parents to specialized centers. According to the available documents, 1-year old children with onset of symptoms are referred to the specialized centers to check their suspected symptoms. Obviously, these early referral reduces the age of diagnosis and allows its prevention by interventions in young ages. According to the data extracted from archival records, the mean age of children at diagnosis was 3 years and 9 months and the most frequent age was 3 years. Hopefully, the increasing rise of social awareness on symptoms of autism spectrum disorder will reduce the mean age of diagnosis.

In the present study, the mean age of fathers was 38 years ranging from 28 to 57 and the mean age of mothers was 33.5 years ranging from 21 to 50. The most frequent level of education was bachelor's degree, followed by high school diploma, master's degree and above, associate degree and under high school diploma for both parents.

Autism is a disorder which involves all segments of society. Because of underdevelopment of medical services in less developed countries, autism is more observed among average to high socioeconomic groups.

In this study, male to female ratio was six to one. Obviously, frequency of diagnosis was higher in boys than in girls, which is consistent with literature [1-4]. This difference could be due to higher developmental delay in girls with autism sent to the centers for retarded children, rather than autism centers, while many symptoms of autism can be diagnosed and improved in their children.

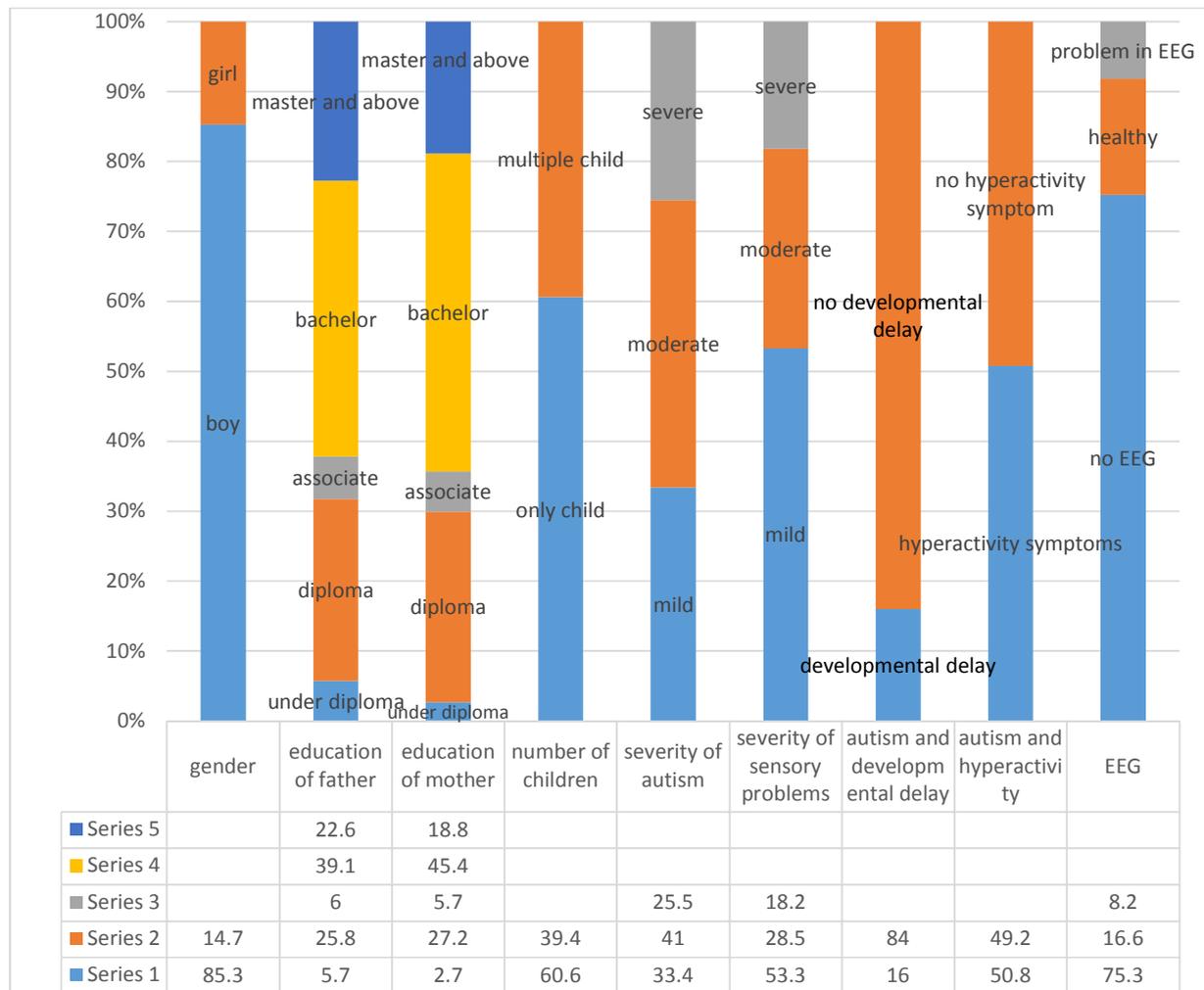


Figure 1: summary of the data extracted from archival records

Most of these children are only child at least at diagnosis. This suggests that being only child and being alone most of the time (relative to children with other siblings) can stimulate the genetic factor of this disorder and manifest the symptoms. Moreover, this disorder probably imposes large amounts of stress and psychological, social and economic costs on parents; as a result, families tend not to have another child. In some cases, fathers keep distance from their families because of high stress imposed on them [24].

The most frequent severity of autism at diagnosis was moderate. The severity of autism may increase, decrease or even not change by receiving interventions or over time. Children with autism who receive an inefficient intervention or none may transition into an impaired cycle which leads to the increased growth of disorder, higher isolation and worsened symptoms. Moreover, children with concurrent problems such as developmental delay, sensory problems, seizure etc. show less improvement. On the other hand, the symptoms will clearly decrease under

efficient interventions and interactions at all waking hours of the child. In the middle of these two extremes, there are people who do not considerably change during treatment [25].

The most frequent severity of sensory problems at diagnosis was mild autism. The higher severity of autism symptoms is associated with higher number of impaired senses. Sensory problems will also change over time during treatment [26].

More than half of these children showed symptoms of hyperactivity at diagnosis; this is consistent with studies which found overlaps between autism and hyperactivity [12 and 13]. Note that, the control of hyperactivity symptoms is different from hyperactivity disorder and requires different interventions. These symptoms should be considered in interventions; otherwise, the progress will be slow [11].

Most children had no developmental delay at diagnosis and less than one fifth of them showed developmental delay. Obviously, this proportion is similar to the normal intelligence curve of normal children. However, as these children are young, reduced IQ (Intelligence Quotient) is predicted over time with no rehabilitation services. This is consistent with a study which showed that autistic people without mental retardation were more than autistic people with retardation [25].

One third of children who underwent EEG at diagnosis showed some problems. These problems did not follow a certain model which can be effective in diagnosis of autism; on the contrary, these problems were unspecified problems which can be observed in any child.

#### CONCLUSION

The results of this study and other similar studies can be used for identification of children with autism and children prone to this disorder. Moreover, the results can be useful in developing health plans and policies of the Ministry of Health for these children.

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