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STUDY TO EVALUATE LAG IN DIAGNOSIS AND THERAPY INITIATION AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD)

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ABSTRACT

Objective: The present study was aimed to evaluate the various reasons for lag in diagnosis and treatment of ASD patients.

Methods Cross-sectional, observational study involving parents of 80 children with autism spectrum disorder diagnosed with DSM 5 criteria.

Results: The male child and male: female ratio of study participants was 2.4:1. We observed that parents were not sure regarding the first health professional to be contacted. Patients had reported one or more than one reasons for probable lag. Lack of awareness of symptoms, long time required for evaluation, COVID 19, and denial of the parents of having any developmental disorder are some of the prominent reasons for lag.

Conclusions: We observed that parents were not sure regarding the first health professional to be contacted. Lack of awareness of symptoms, long time required for evaluation, COVID 19, and denial of the parents of having any developmental disorder are some of the prominent reasons for delay in diagnosis and treatment.

Keywords: autism, Delay in diagnosis, ASD

INTRODUCTION

Autism spectrum disorder (ASD) is a developmental disability which is of great public health importance. ASD comprises of a group of complex and heterogenous neurodevelopmental disorders with lifelong disabling consequences. It affects a child in an early developmental period. Autism was first described by Leo Kanner in 1943 as an inherent inability to have normal emotional contact with others. **(1)**

At global level the prevalence of ASD is reported to be 61.9/10,000 in 2012. **(2-5)** It is reported that the prevalence of ASD in India is 0.09-0.23% and approximately 1.7–2 million children are having ASD in India. **(2-5)** The exact estimation of prevalence of ASD is difficult in Indian scenario because most of the studies are hospital based and not from community settings, lack of uniform diagnostic tools, absence of fully validated and translated autism diagnostic tools, under recognition of the disorder due to a delay in the diagnosis of ASD. **(6)**

ASD is a spectrum disorder with varying clinical severity where the manifestations are observed in early childhood, usually before the age of three. It impairs all aspects of the child's functioning to produce lifelong disabilities. (7) It is characterized by qualitative impairments in social and communication skills along with restricted, rigid, repetitive and obsessive pattern of interest and behavioral activities. (7-9) ASD is characterized by typical symptoms like impaired verbal and nonverbal communication, impaired social interaction, and restricted or repetitive patterns of behavior. ASD is also characterized by symptoms like impaired verbal and nonverbal communication. Children with ASD may have a spectrum of symptoms at presentation like avoidance or poor eye contact, difficulty in mixing with peers and lack of emotional reciprocity, delayed speech. Child affected with ASD may have mild to severe forms of symptoms at presentation. Difficulty in interacting and communicating with others is one of the most prominent Features of ASD. This will lead the child to have isolated activities, avoid eye contact or get fixated on a word or object. Kids with ASD may often have abnormalities of cognitive functioning, learning, attention and sensory processing. (7)

The cause of ASD remains unclear many a times. (10) Usually, symptoms get manifested approximately by the age of 3 years. Although signs of ASD may develop as early as in the first two years of life, (11) there may be delay in diagnosis attributing to multiple factors. The early development of child before the actual observation of symptoms is normal for the initial first 1 year or more. (7, 12) The average age at the time of diagnosis for ASD have been observed to be in the range of 3 to 6 years. (13,14) Studies have revealed that, missed diagnosis and wrong diagnosis of ASD are common. (7) This may be caused partly by lack of awareness and inadequate screening practices and also the variable nature of presenting symptoms of disease. Screening of the suspected patient for appropriate referral, timely diagnosis, and treatment will help for early intervention. Early identification of ASD and intervention are necessary to reduce children's long-term intellectual, behavioral, and functional impairments as well as family burden. (7)

The period between parental observation and diagnosis of ASD represents a crucial period and any delay will deprive the child, family and therapist of early intervention. (7) Early Interventions like early social skills training, preferably before school age, may improve the development of children with ASD. Initiation of early intervention improves long-term prognosis whereas treatment yields diminishing returns as children get older. (13) The improved outcome will have significant impact on cost of care and results in considerable cost savings to both families of children with ASD and the overall healthcare systems. (13)

The diagnosis of ASD may become difficult if a child is having coexisting conditions like cognitive abnormalities, intellectual disability, sensory symptoms, such as hyper/ hyposensitivities to touch, taste, smell, and sound, atypical motor development, full form of ADHD, anxiety disorders, sleep problems, and seizure disorders. (7, 12)

ASD as a disease, affects the life of child, but the entire family goes through a life-changing traumatic experience. Additionally it requires specialized health care, support for education, and rehabilitative services. (6)

It has been observed that parents' first recognition of unusual symptoms, seeking health care advice for the same, screening of the child for ASD, establishing the diagnosis and initiation of the interventions are some of the key steps in proper management of ASD. There is a potential for considerable delay in each and every step depriving the child of early intervention. Several factors influence initial symptom recognition and final diagnosis. Lack of awareness, unavailability of services and stress contributes to the delay in ASD diagnosis.

Many children with ASD are not diagnosed till they grow up to school going age. Multitude of factors have been implicated in causing the delay. In addition to the factors attributing to parents, physician related factors also play an important role. General physicians have been observed to have limited knowledge of the presentation, prognosis and treatment of ASD. This will cause delay in child assessment by specialist doctors. A number of family related factors known to be associated with delays in diagnosis includes financial conditions of the family, number of children, parental behaviors, etc. (2) Sometimes parents did not readily accept any unusual behavior in their children and remained in denial mode till late age. (2) On the other end of the spectrum some parents seek medical help as soon as they noticed unusual behavior in children. (2) In addition, some parents do not rely on one doctor but take opinions of multiple doctors for confirmation of diagnosis or starting the therapy. (2) All these factors are potential reasons for delay in diagnosis and actual therapy. (2) Kentrou et al reported that gender differences in ASD related behaviors might be observed because it is easier to detect ASD behaviors in boys whereas girls with ASD exhibit some superficial social skills and adjustment with disease process. Boys with ASD are reported to exhibit greater externalizing symptomatology and girls do not exhibit externalizing symptomatic behaviors. (7,15) Thus, boys are more likely to be identified and diagnosed. This differential manifestation may result in disproportionate male-to-female ratio. (15)

Different kinds of therapy that can be given to the children includes home based or rehabilitation based. The rehabilitation therapies include behavioral therapy, sensory integration therapy, speech therapy, and special education. (2)

There is a dearth of information on the pattern of impairments and diagnosis of ASD among affected children In India. There is likely to be a gap between onset of symptom and recognition of the same by parents, health seeking and establishment of diagnosis and start of therapy. There is a possibility that multiple factors may play a role in the delay of ASD diagnosis and therapy initiation. These factors may be specific to parents, clinicians, healthcare systems and/or the disease itself. Hence, in this backdrop, our study was conceptualized. Our study intended to identify the time lag for diagnosis and management of ASD along with various factors contributing to the same, if any.

MATERIAL AND METHODS

The study was of Prospective, Cross-sectional, observational type. Consecutive children (1-12 years) with diagnosis of ASD and attending the OPD at the study center were screened and enrolled in the study. For diagnosis of ASD, DSM-5 criteria was used. The Children with features of ASD secondary to visual or hearing impairments, Children with neurometabolic disorders and Children with any other organic neurological illness were excluded from the study. Informed consent/ascent was obtained from the parent.

Developmental history of the child was collected from parents, preferably from mother. Parents were interviewed to collect the information about their concerns regarding developmental delay and history of earlier visits to hospital settings for the same problem Previous medical records if available were reviewed. After the diagnosis, ISAA Scoring was done and interventions in the form of medical treatment and behavioral therapy were done if ISAA Score was $\geq$ 70. Short sensory profile-2 scoring was also done. Time lag of various events (like observation of problem by parent, diagnosis by doctor, starting of therapy) was noted. All the information including history and assessment of child was collected in a pre structured Case Record proforma that included four major sections and were provided in the same order for all participants.

The first section included general and demographic information (i.e., relationship to child, educational status of the parent, income).

The second section included questions specific to the various risk factor associated with ASD diagnosis.

It was followed by the timeline that noted age at when symptoms noticed, time required to establish the diagnosis and time required to initiate the treatment after diagnosis. Information was also collected about the various reasons associated with lag. In the last part Short Sensory profile of the children was also studied since it has been observed that ASD affects sensory function.

Sample Size was calculated using formula Sample size (n)= $\dfrac{(Z1\text{-}\alpha/2)^2 * (p)(q)}{(d)^2}$

estimated true proportion of children with ASD as 3 %

Where n- Desired sample size, Z- z-statistics for desired level of confidence (i.e. 0.04) (1.96 for 95% CI), p - The estimate of Expected proportion with the variable of interest in the population (0.03), q- 1-p and d- The precision level (0.04).

Sample size calculated was 70 considering 10% drop out 80 cases were enrolled for the present study

The data was entered into Excel sheet. Data was analyzed using appropriate statistical tests. Qualitative data was represented in form of frequency and percentage. Quantitative data was represented using Mean ± SD. p-value of < 0.05 was used as the cut-off for statistical significance.

OBSERVATIONS AND RESULTS

We observed that the mean age of study participants was 6.74 + 2.01 yrs (Mean + SD) which ranged from 2.3 years to 11 years and the median age was 7 years. The 71 % of study population in our study was male and male:female ratio of study participants was 2.4:1. Thus the ASD disease has Male preponderance as observed in other studies. Only 7.5 % cases had positive sibling history for similar disorder. Out of the 80 study participants, 77.5 % were born by normal delivery and 20 % were born after cesarian section. We have observed that 90 % of cases no comorbidity was observed.

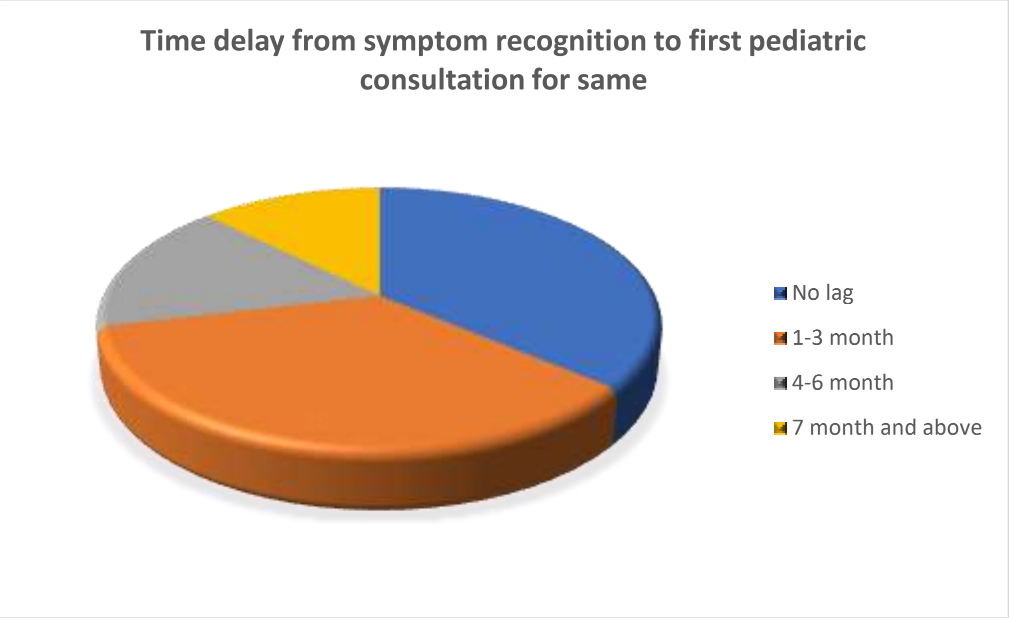
Speech delay is one of the most common (30 %) concern noticed by the parents and caregivers followed by hyperactivity (18.75%). Other symptoms were Poor eye contact, Not responding to called, remaining aloof. We observed that the initial manifestations of ASD were noted mainly by parents in 93.75% cases. Most of the children were of 3-5 years of age at the time when parent/ caregivers expressed concerns about the condition. The mean age at the time of first concern was 43.9 $\underline{+}$ 12.45 months (mean $\underline{+}$ SD) and median age was 48 months. We found that the earliest age at which symptom noticed was 24 months while it was observed as late as 72 months. After noticing the initial symptoms of ASD, medical opinion was sought immediately in 36.25% cases. While 35 % cases seek medical advice within 1–3-month period. But 12.5 % cases had a considerable delay of more than 7 months before getting any medical advice after noticing the initial symptoms of ASD.

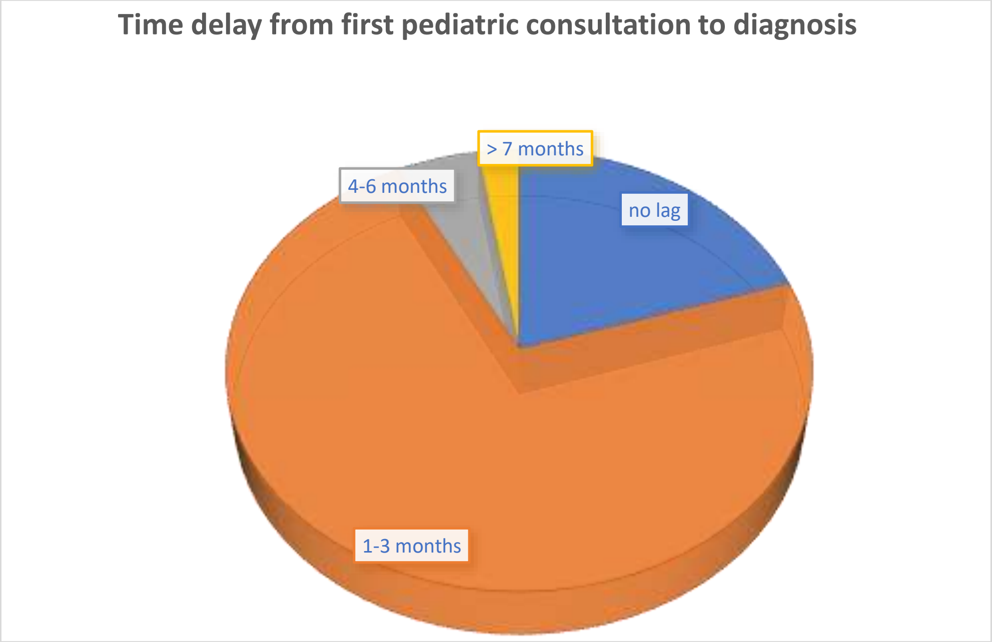
We observed that clinical psychologist, Neurologist, Pediatrician and Psychiatrist had diagnosed 36.25, 22.5, 16.25 and 25% cases respectively. It probably indicates uncertainties in the mind of common public in regards to consultation. Mandell et al cited that consulting more than one doctor (doctor shopping) could be contributing to the delay in diagnosis. (13)

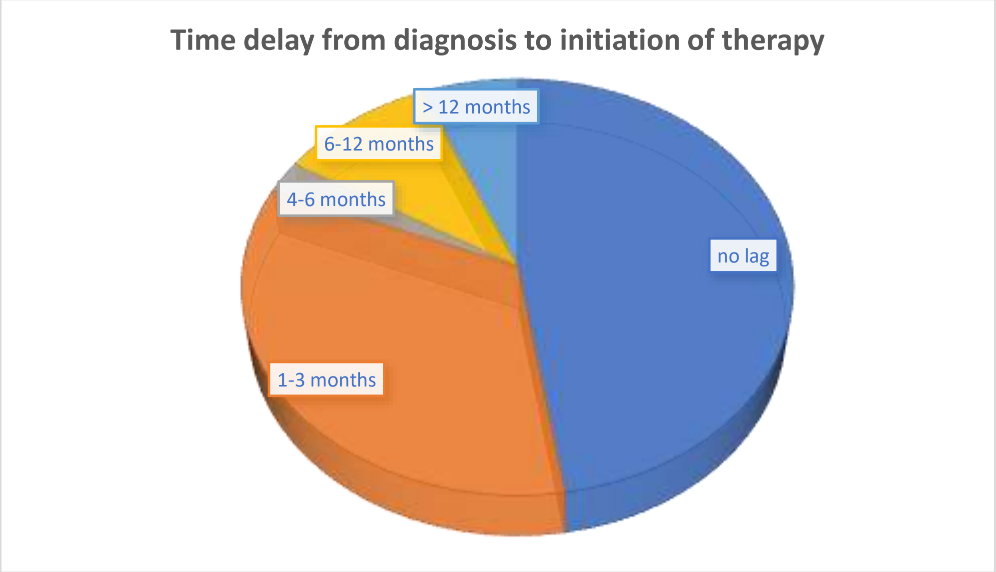
Almost 80 % of children received intervention after diagnosis at the earliest. But 16% children took more than 6 months for starting therapy after diagnosis. Furthermore COVID 19 pandemic added to the misery of children.

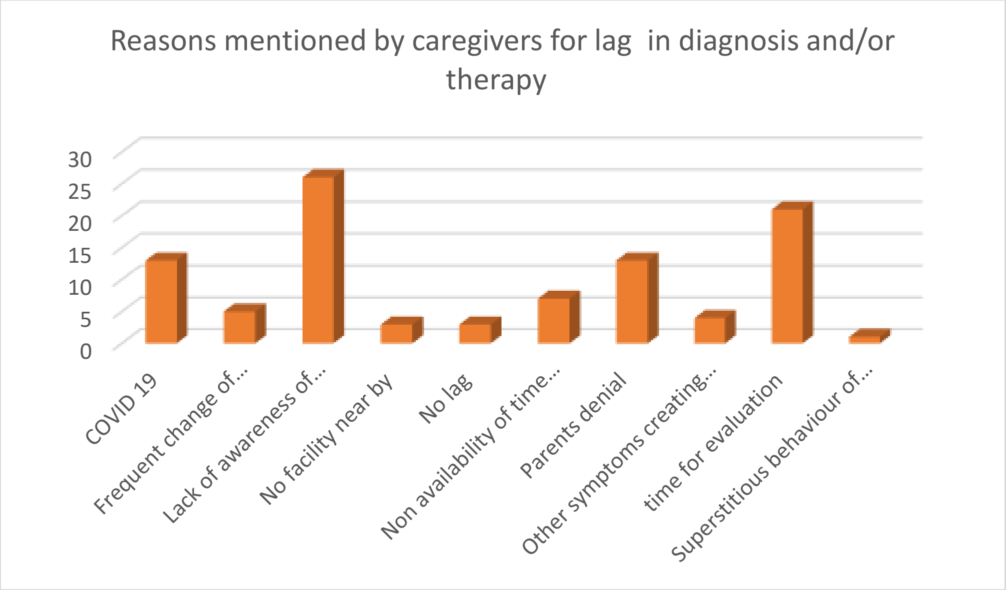
Children had reported one or more than one reasons for probable lag. Lack of awareness of symptoms, long time required for evaluation, COVID 19, and denial of the parents of having any developmental disorder are some of the prominent reasons for delay in seeking medical help.

There was no significant difference in sensory profile score between male and females.




Time delay from first pediatric consultation to diagnosis
> 7 months
4-6 months
no lag
1-3 months


Time delay from diagnosis to initiation of therapy
> 12 months
6-12 months
4-6 months
no lag
1-3 months


Reasons mentioned by caregivers for lag in diagnosis and/or therapy
30
25
20
15
10
5
0
COVID 19
Frequent change of...
Lack of awareness of...
No facility near by
No lag
Non availability of time...
Parents denial
Other symptoms creating...
time for evaluation
Superstitious behaviour of...

DISCUSSION

ASD is a disorder of neural development characterized by impaired social interaction. The earliest possible time for Age of the first Concern and Age of Diagnosis in ASD is not uniform and not well defined. It has been observed in past that multiple individual and family related factors, as well as geographic characteristics affect Age of Diagnosis and often Age of the first Concern, contributing to delay in initial diagnosis of ASD. This further leads to delay in starting of treatment, thereby delaying the chance of possible early intervention. (2,7) Prahbhjot M et al concluded that there occurs delay in the recognition of autism in children from rural areas, especially for girls, large-sized families, and milder form of the disorder the probable reasons put forth were limited access and utilization of specialty health-care services, geographical barriers, financial hardships, biases in referral practices, lower levels of education, and limited awareness about autism. (16) A multi-pronged comprehensive approach is necessary for early identification of ASD which must consider inter related cultural, educational, and health system factors. (17)

Mandell et al (12) found that Children with autistic disorder received the diagnosis at an average age of 3.1 years. Similar findings were observed by Rachel A Rhoades et al(18), Laura Pérez-Crespo et al(19), Daley et al (20) and Pranab Mahapatra et al(2). In our study, the mean age at the time of first concern was 43.9 ± 12.45(mean ± SD) and median age was 48 months. We found that the earliest age at which symptom noticed was 24 months while it was observed as late as 72 months. Thus the results of our study were in accordance to published studies. Early diagnosis of ASD is very important since the evidence suggests that interventions to improve the functioning in ASD children may be more effective in younger age groups, and early treatment improves long-term prognosis along with better results(12). It has been reported that, ASD symptoms are typically recognized during the second year of life (12–24 months). The age at the time of first concern mainly depends upon the presentation. The disorder can be diagnosed as early as 12 months, if developmental symptoms are severe, or after 24 months, if symptoms are more subtle [8]. Pranab Mahapatra et al (2) observed that Parents were the first to notice something unusual in their child~~.~~ Our study had also same finding.

ASD have been observed to have a higher prevalence in males. We observed that the 71 % of study population is comprised of male child and male: female ratio of our study participants was 2.4:1. Onaolapo AY et al (21), Laura Pérez-Crespo et al (19) and Sharda V.et al (22) also observed male preponderance in their study.

The causes of the observed male bias may include genetic factors or differences in detection and diagnosis. Other possible reason for male bias is that genes on the sex chromosomes and sex hormones, particularly testosterone, may modulate the effects of genetic variation on the appearance of an autistic phenotype. (19)

Sharda V.et al (22) reported delayed speech whereas Pranab Mahapatra et al (2) observed that the social difficulty was the major initial symptom of concern by maximum number of parents (46.1%) followed by delayed language In our study we observed that in almost 58 % of cases speech delay was the major concern followed by not responding to being called.

In our study, clinical psychologist, Neurologist, Paediatrician and Psychiatrist had diagnosed 36.25, 22.5, 16.25 and 25% cases respectively. It probably indicates uncertainties in the mind of common public in regards to consultation.

Pranab Mahapatra et al (2) observed that after recognition of initial symptoms, some parents chose to stay at home, while some consulted doctors, discussed among friends and relatives, or searching the internet for more information. We observed that after noticing the initial symptoms of ASD, medical opinion was sought immediately in 36.25% cases. While 35 % cases seek medical advice within 1–3-month period. But 12.5 % cases had a considerable delay of more than 7 months before getting any medical advice after noticing the initial symptoms of ASD.

The parental conceptualization of illness had a wide spectrum ranging from scientific explanations to supernatural explanations. This finding of lack of awareness can be seen in even for parents who were educated. Lack of awareness about ASD has often been cited as one of the reasons for delayed recognition of symptoms and initiation of diagnosis or treatment. The Pranab Mahapatra et al (2) in their study observed that parents of ASD children have considerably good education and higher qualification, Inspite of the well-educated status, parents' awareness on ASD was lacking. Shyu et al **(23)** have also similar finding that well educated patient lacked awareness. It was to such an extent that the parents even sought supernatural explanations for the disorder. **(2)** In our study parents of 72.5 % cases were graduate. In our study, after noticing the initial symptoms of ASD, medical opinion was sought immediately in 36.25% cases. While 35 % cases sought medical advice within 1–3-month period. But 12.5 % cases had a considerable delay of more than 7 months before getting any medical advice after noticing the initial symptoms of ASD. After reaching the hospital, more than 90 % of cases get diagnosed with ASD within 1-3 month. But few patients require more than 6 months to get formally diagnosed with ASD. COVID 19 pandemic added to the misery of children as lock down and subsequent restrictions was one of the reasons cited by parents for delay. We found almost 80 % of patients received intervention after diagnosis at the earliest. But 16% patients took more than 6 months for starting therapy after diagnosis.

Pranab Mahapatra et al **(2)** observed that parents also did not rely on one doctor and consulted more than one doctors to confirm their diagnosis. The frequent change of doctors contributed to the delay in diagnosis.

Hetal Tripathi et al **(24)** observed the children with ASD has lower mean score of short sensory profile i.e. (127.20) than children without ASD (149.40) which indicates the children with ASD shows frequent behaviors.

Pranab Mahapatra et al **(2)** reported that 76.7 % children were first child while 23.7 % were second or later child. We observed that most of the study cases were 1st born child (57.5%). While only 2.5 % cases were having birth order of 3 and 40 % were second child. It is observed that ASD is more common in first child

COVID 19, Frequent change of treating doctors, Lack of awareness of symptoms, no facility nearby, no lag, non-availability of time for therapy, parents' denial, other symptoms causing delay in diagnosis like ADHD/hearing impairment, prolonged time for evaluation, superstitious behavior of parents are some of the reasons observed in our study for delay in diagnosis and treatment.

Zwaigenbaum et al **(25)** has recommended that interventions shall include a combination of developmental and behavioral approaches and shall begin as early as possible. The Interventions should enhance developmental progress and improve functioning of ASD affected child, in areas like social communication, emotional/behavioral regulation, and adaptive behaviors. **(26)** The interventions shall have active involvement of families and/or caregivers. Thus, concluded that early identification of ASD will help to strategize about the interventions.

LIMITATIONS

- We were unable to approach true prevalence or true changes since we included ASD cases only in clinic-based setting.
- AOD or AOC over time were reported by parents by recall where caregivers were asked to recall events that may have happened much earlier and had a scope for information bias.
- We do not have information on on issues related to social factors
- SARS-COVID 19 pandemic was an unprecedented event which contributed to additional delay in our study

STRENGTHS OF THE STUDY

- The study deals with ASD which is a common entity
- Simple study design
- There are no previous studies on this aspect from the Indian subcontinent
- Results from the study may work as a basis for designing future studies that can try to bring down gaps in diagnosis and institution of therapy for ASD

RECOMMENDATIONS

It is recommended to conduct a long term, prospective, community-based study on the children with ASD with special emphasis on socioeconomic factors in order to estimate the actual lag in diagnosis and therapy institution of this entity which will enable the planning of targeted social engineering activities for better care of children with ASD.

CONCLUSION

We observed that the mean age of the study participants was 6.74 + 2.01 yrs (Mean + SD) which ranged from 2.3 years to 11 years and the median age was 7 years. The male child and male: female ratio of study participants was 2.4:1. We observed that parents were not sure regarding the first health professional to be contacted. Patients had reported one or more than one reasons for probable lag. Lack of awareness of symptoms, long time required for evaluation, COVID 19, and denial of the parents of having any developmental disorder are some of the prominent reasons for lag.

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