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RESEARCH ARTICLE

# Early detection of autism spectrum disorders: a responsible decision for a better prognosis

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## ABSTRACT

**Background.** Early detection of autism is a decisive variable for a better prognosis.
**Methods.** A study was conducted describing the process of detection and diagnosis of 42 children with autism spectrum disorders (ASD).
**Results.** Parents are those who initially suspect the presence of a disorder at about the age of 22 months. The most common warning signs include behavior described as appearing absent, lack of language, and motor delays. Five different health care professionals are involved in the detection process. The pediatric neurologist and psychologist are the professionals who most frequently diagnose ASD between 3 and 5 years of age. Diagnoses given to the families include intellectual disability, attention deficit disorder with hyperactivity, and developmental delay.
**Conclusions.** The results of the study show the importance of training health care professionals, leading to the early detection and intervention of ASD.

**Key words:** autism spectrum disorders, early detection, pervasive developmental disorders (PDD).

## INTRODUCTION

Autism is a disease of neurobiological origin that originates a different course of development in the areas of verbal and nonverbal communication, social interactions, flexibility in behavior and of interests.[1,2] It is, therefore, a syndrome that is a set of behaviors simultaneously altered at three levels. Currently, autism spectrum disorders (ASD) are used to make reference for all the variations in the manifestation of the disorder[3] including typical autism, also known as Kanner type, and Asperger disorder, that is differentiated from classic autism because there is no clinically significant language delay and cognitive abilities are normal.[4,5]

The conceptualization of autism has varied since 1944 when Kanner and Asperger analyzed the characteristics of a group of patients who they referred to as autistic. The explanatory hypothesis has been maturing and becoming complicated, similar to the findings of different groups of investigators.[6-12] Today there are neuropsychological models that support the neurobiological nature of autism.[13-15] The first theories that proposed the relationship of the symptoms with an affective link distant from the child's parents[16] have given way to explanations in which the mirror neurons,[17,18] executive functions[10-19] and especially the neuronal connectivity and the processing of information[10-12] play a relevant part. Evidence suggests that in autism there is a failure in the development of the neuronal network, giving rise to a poor connectivity that particularly affects the far cerebral regions. This makes it difficult for the child to perform complex behaviors that require coordination between different parts of the brain.[13] Characteristic symptoms that lead to these differences in cognitive functioning of persons with ASD are related to the three following fundamental aspects.



- Social relationships: Persons with ASD show little motivation to interact with peers and have difficulty in spontaneously understanding the codes, rules and principles that govern social interactions. From an ear-

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ly age, significant differences have been found among children later diagnosed with autism and peers without the disorder, in behaviors such as eye contact, social smiling, imitation, social interest and expression of emotions.[14]

- Communication: The most significant difficulties of persons with ASD in this regard refer to the social use of language, i.e., the spontaneous use of the innate ability of humans to express desires, thoughts, and experiences to other persons, but also include the possibility of understanding and responding to these messages transmitted by others. Delay in the emergence of language is one of the symptoms that begins to alarm the parents, although differences were found even from the pre-linguistic stage, with less intentions at communication or protodeclarative behaviors, e.g., show of elements of interest combined with gestures, verbalizations and visual contact with the speaker.[15]
- Repetitive behaviors and mental inflexibility: The third characteristic of persons with ASD, evident from the first years, refers to the preference for actions that are repeated with a certain pattern, whether with the body or with objects and the fascination for determined elements, themes or activities resulting in being of little function and interfering with other daily activities, with learning and participation in the social milieu. The subject's insistence with invariability results in resistance to change and translates into emotional reactions and intense behaviors.[13-15]

With regard to epidemiological data, although the methodological differences make it difficult to make comparisons among studies, the best current estimate of the prevalence of all ASD in several countries is ~58.7/10,000 (1/170 persons).[16] However, studies conducted in 2009 show that there has been an increase in the number of persons with a diagnosis of ASD. It was found that 1% of the population in the U.S. is affected by this disorder,[17] for which it has emerged as a public health concern.[3,18] With regard to the figures in Colombia, no specific data are known because the 2005 census sheds global data with a prevalence of 6.4% of the population with at least one type of disability.[19]

Diagnosis of ASD is made, on average, at 5 years of age.[20] However, it has been suggested that some atypical signs are present from the first year of age, especially disorders in social communication skills and visual contact.[21] This is fundamental if one remembers, at present, the trend is for early detection and care, which are relevant for the evolution and favorable prognosis of persons with ASD.[3] The earlier the diagnosis is made, the faster proper care can be provided to the child and to the family.[17-25] In such a manner, achievements in regard to functional skills, communication[19] and intellectual functioning[20-23] can be increased. Also, some of the more severe manifestations of this disorder can be avoided.[21] Intervention before 3.5 years of age is more effective than that which begins at 5 years of age.[1] The above is possible, provided the programs are systematic, carefully planned and include individualized goals to be carried out intensively during the first 5 years of life.[22]

Thus, an intensive behavior intervention results in >75% of the children learn to speak.[26] In addition, almost 5% of children who begin the intervention at 2 years of age do not present all the symptoms of autism at 9 years of age.[27] Nevertheless, more frequent is that the parents go through what is called a "carousel of professionals" in the process of detecting ASD, such that in order to obtain a correct diagnosis an average of three or four health professionals are consulted.[28]

This information agrees with the results obtained in the studies regarding the process of detecting ASD. Filipek et al. found that more than half of the parents with children with a later diagnosis of ASD manifested worries about their child's development from 18 to 24 months of age; however, in most cases the health professionals calmed their fears and explained it as maternal anxiety or diversity in development.[29] Close to 20% reported that they had to insist so that they would be referred to new specialists or to look for a private consult; ~30% of the parents referred to a new professional reported that no help was offered and only 10% reported that a professional explained the child's problems to them. Finally, it was found that, on average, the diagnosis was made at 6 years of age, a time in which close to half of the families reported that the school system and other parents were the main source of support instead of the health system.

A similar study was done in Spain where it was also affirmed that the family is the first to suspect a problem, with a mean age of ~22 months. However, in this study the average age for the final diagnosis was 4 years

and 3 months, which results in being much lower than reported by Filipek et al.[29] According to this investigation, in the case of Asperger disorder whose symptoms are frequently appreciated much later, the mean age of suspicion is 36 months, but a diagnosis is finally found, as a mean, at 9 ½ years of age. It should be noted that only 5% of the families surveyed identified their pediatrician as the person who initiated the diagnostic process.[30] Keeping in mind that there are few studies in Latin America on the process of detection that families with children who present an ASD go through, this investigation sought to describe how the process of detection of ASD has been in children who were evaluated in a Foundation in Medellin (Colombia), recognized for their work on the evaluation and intervention with this population.

## SUBJECTS AND METHODS

A descriptive, retrospective study was carried out having, as a reference population, children with diagnosis of ASD receiving care in an institute specializing in ASD intervention. The children were referred to this unit by health care professionals affiliated with local governmental facilities or from their private practice. Diagnosis of children in the Foundation is carried out or confirmed following best practices defined for the diagnosis of autism, among which there are exhaustive reviews of the developmental history, active participation of the family and professionals from various areas.[31] With this in mind, all children admitted to the Foundation should comply with 3 hours of evaluation with the child and the family, divided into 1 hour sessions during 3 consecutive days. The presence of at least one of the parents has different ends: provide information, interact with the child and observe the child's performance. This process is conducted by two professionals with experience in the evaluation of developmental disorders (a child neuropsychologist and language therapist), employing as a diagnostic tool the ADOS and diagnostic criteria of the DSM IV-TR.

The sample evaluated was composed of 42 families who had been admitted to the Foundation during the last 5 years. The parents accepted participation in the study. The ages of the children were between 2.6 and 10.75 years, with a mean age of 6.57 years (95% CI: 5.95-7.14); 69% of the children were males and 76.2% presented with classic autism. At the time of evaluation 61.9% of the sample attended an educational institution in a parallel manner to the Foundation. The proportion of children with classic autism and those with high functioning was random because all have access to the services offered by the Foundation.

*Procedure.* The information was principally obtained by means of a specifically designed semi-structured interview with the child's parents. During the interview, questions were asked about the process of detection and diagnosis of the child prior to admission to the Foundation. Questions were asked about medical and psychological examinations and of other health professionals in the child's history: persons who suspected there might be a problem, indicators in which they were based for providing this concept, diagnostic examinations performed in the process and the concept that the professionals gave about the difficulties presented. The design for this interview was carried out in meetings with team members and was subjected to a pilot test with a parent from the Foundation who is also a health professional who knew the objective of the study and provided concept about the questions and the interview process. This led to adjustments and the definitive version for the interview. Finally, in order to standardize the process, the examiners were trained via modeling sessions.

For sample collection, all families who were admitted to the Foundation during the previous 5 years were invited by letter. They were subsequently contacted by telephone. Those who agreed to participate signed an informed consent and proceeded to an in-person interview within the premises of the Foundation. Subsequently the clinical history was reviewed in order to obtain additional data about the children. This project received approval from the Ethics Committee of the CES University who classified it of minimal risk.

*Statistical Analysis*. Data were digitized in an Excel 2003 database and were imported to SPSS v.15 for the respective statistical analysis. Descriptive statistics for each variable were obtained. Subsequently, in order to compare groups of low and high performance, it was initially analyzed if there were normal distributions. An analysis of differences in averages and medians for the quantitative variables was performed as well as association analysis for the qualitative variables.

## RESULTS

The interviews carried out showed that the suspicions about the presence of an ASD in children presents itself on the average at 1 year and 10 months of age, with a minimum age of 7 months and maximum of 5 years of age. With respect to the diagnosis, the average age was 3 years and 2 months of age (m = 3.20; 95% CI: 2.8-3.58) with 1 year and 6 months the minimum age and 7 years the maximal age at the time of the diagnosis (Table 1).

Of the sample analyzed, 81% of the children presented delay in language development and 57.1% in motor delay. With regard to the language loss, i.e., those who had a seemingly normal language development and who then lost it, it was found that 38.1% of the sample presented this type of regression.

With respect to the process of growth and development, 11.9% of the sample did not attend the evaluations. Among those who had some type of follow-up with a health professional, 67.5% were told that there was no problem in their child's development. Only 10.8% of the sample was referred to another professional because of some suspicion of developmental problems, whereas in 21.6% there were differences or difficulties in development, but no alternatives were suggested to the parents.

Regarding the persons who first suspected the presence of some type of problem in the children, 59.5% of the cases identified the parents as the first persons. Next were teachers (21.4% of the cases). It is important to note that only in 2.4% of the sample was the physician the first person who suspected the disorder (Figure 1). Characteristics that generated the most caregiver suspicion about the presence of a developmental problem were as follows: in terms of social, 92% of parents perceived that the child had an absent look, and 51.7% kept themselves isolated from other persons. In regard to communication, absence of language was the most significant (50%); in the behavior, 35.7% of the parents perceived their children as aggressive; and 52.4% of cases presented a motor delay (Table 2).

With respect to the number of professionals visited during the process of detection, it was found that on average the parents visited approximately five professionals (m = 5.38; 95% CI: 4.79-5.95) before their child was finally diagnosed with autism; 21.4% of the sample had visited seven professionals, which was the greatest frequency found. The minimum number of professionals visited was two, which was found in 7.1% of the sample, whereas 2.4% of those interviewed visited ten professionals as the maximum number.

In the sample evaluated, on average, two referrals were made to other professionals in the diagnostic process (m = 2.43; 95% CI: 1.95-2.90). In 4.8% of the cases there was none, and in the same percentage of cases six were carried out as a maximum number of referrals that were found in the sample. It should be noted that the greatest percentage was present in 38.1% of the cases who received only one referral.

Among the professionals most visited in the process of ASD diagnosis was the language therapist (71.4%) followed by psychologists (52.7%) of the cases and the child neurologists in 42.9% of the population. It was also found that the pediatricians (those from "health-promoting entities" [HPE] and not those associated with them) and the physicians of the HPE comprise part of the professionals most visited by the families. In some cases, the families were referred to various professionals who independently provided their diagnostic impressions.

On average, children with ASD received two diagnoses by health professionals before being correctly diagnosed with an autistic disorder (m = 2.02; 95% CI: 1.74-2.31). It was found that only 33.3% of the sample received a diagnosis, whereas 4.8% of the sample received up to five different diagnoses. In 26.2% of the sample, children were diagnosed with an attention deficit disorder or hyperactivity (ADHD) and 26.2% received diagnosis of developmental delay. These were followed with the diagnoses of intellectual disorder and "poor upbringing," both with 11.9%. During the diagnostic process, two exams, on average, were suggested to rule out other types of diseases or behavior disorders (m = 1.93; 95% CI: 1.50-2.33). Among these, the most common are sleep studies, EEGs and evoked potentials, with only one case having abnormal results (2.4%). In 85.7% of

**Table 1.** Age of suspicion and diagnosis in a sample of children with ASD



| | Minimum | Maximum | Mean (SD) | 95% CI |
|---|---|---|---|---|
| Age at initial suspicion (years) | 0.58 (7 months) | 5 | 1.85 (0.96) | 1.57-2.15 |
| Age at time of diagnosis (years | 1.5 | 7 | 3.19 (1.308) | 2.8-3.58 |

SD, standard deviation; 95% CI, 95% confidence interval.

the neuropsychological tests applied, the atypical results of ASD were present.

In 35.7% of the cases, the pediatric neurologist was the health professional who diagnosed the ASD followed by psychologists in 31%; 11.9% of the diagnoses were made by the speech pathologist. Only 4.8% were made by the pediatrician and 2.4% by a psychiatrist.

The most significant clinical indicators that the parents recognized in their children, after having received the diagnosis of ASD, were isolation from others (61.9%); absence of language (45.2%); rapid loss of interest in an activity or object (47.7%); aggressiveness (47.5%); and motor movement delay (38.1%).

## COMPARISON BETWEEN CHILDREN WITH CLASSIC AUTISM AND HIGH-FUNCTIONING CHILDREN

When comparing whether there are differences in the process of detection of ASD, it was found that the number of professionals that the child sees before being diagnosed with autism is lower in high functioning children (m = 3.80, 95% CI: 2.59-5.01) than in those with classic autism (m =5.88, 95% CI: 5.17-6.58), and the difference was statistically significant (t: 3,028; $p$ <0.05). Similarly, the number of tests had the same tendency (Mann-Whitney U 93.000; $p$ <0.05), and resulted in being smaller in those with high function (me =1.10, 95% CI: 0.18-2.02) than in those with classic autism (me =2.19, 95% CI: 1.71-2.67). The other variables did not show significant differences.

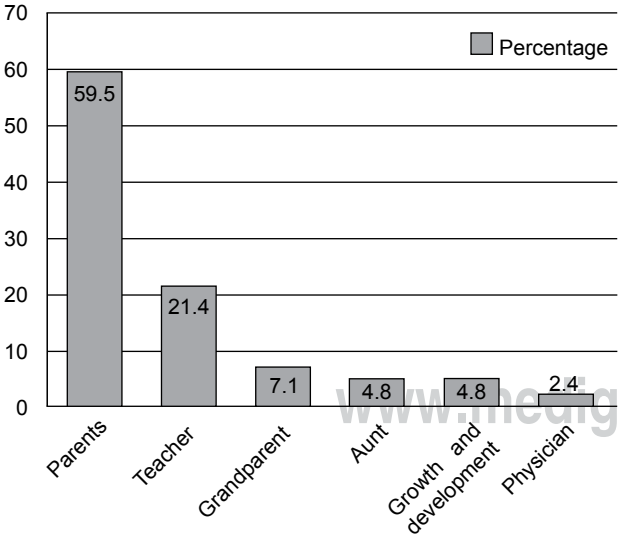


**Figure 1.** First person to suspect diagnosis of autism spectrum disorders in patients.

## DISCUSSION

The results obtained provide relevant information to consider the currently used practices in the process of evaluating a child's development and the detection of ASD. Regarding the first person who suspects the presence of a problem, it was found that in 59% of the cases it was the parents who detected the signals that led to the

**Table 2.** Characteristics of suspicion of ASD

| Characteristics of suspicion | Frequency | Percentage |
|---|---|---|
| Social | | |
| Absent | 39 | 92.9 |
| Isolated | 24 | 57.1 |
| Absence of visual contact | 17 | 40.5 |
| Different game sets | 12 | 28.6 |
| Without boundaries | 1 | 2.4 |
| Echopraxia | 1 | 2.4 |
| Communication | | |
| Without language | 21 | 50.0 |
| Language below that of their peers | 17 | 40.5 |
| No response to calling | 15 | 35.7 |
| Ecolalia | 14 | 33.3 |
| Loss of language | 4 | 9.5 |
| Interests and flexibility | | |
| Stereotypes | 2 | 4.8 |
| Inflexibility to change | 2 | 4.8 |
| Strange noises | 1 | 2.4 |
| Behavior | | |
| Constant movement | 17 | 40.5 |
| Aggressive | 15 | 35.7 |
| Irritability | 12 | 28.6 |
| Problems with sleep | 10 | 23.8 |
| Cry of anguish | 9 | 21.4 |
| Very clingy | 6 | 14.3 |
| Hypersensitivity to noise | 5 | 11.9 |
| Without perception of danger | 2 | 4.8 |
| High pain threshold | 1 | 2.4 |
| Motor | | |
| Motor delay | 22 | 52.4 |

ASD, autism spectrum disorders.

search of a concept, data that were coherent with that found by Filipek et al.,[29] Hernández et al.[30] and Martos-Perez.[32] However, as pointed out by Cabanyes-Truffino and García-Villamisar,[33] early suspicions do not mean that the parents receive clear information about these syndromes until much later.

Because of this, it is believed that both health and education professionals should validate the families' concerns and keep in mind that those who live with the child and external referrals provide them with information on the child's development, which is not comparable with the indicators obtained in an artificial and restricted environment as is the consultation room. The family is fundamental in the process of identifying the possible signs of alarm in the child's evolution. Their fear or resistance to begin a process of diagnosis in order to avoid labeling of their child, according to what was revealed by Rust, do not limit the recognition of the symptoms or the actions to look for a diagnosis.[34] Therefore, it is of utmost importance that when a family expresses their preoccupation due to some atypical symptom of the child, the professionals utilize a screening tool that may be the M-CHAT or any other that may be available.[35] It should be mentioned that, at present, there is a validated version of M-CHAT available in Argentina.[36]

Teachers are in second place according to those who suspect some type of problem and suggest an evaluation because they have better knowledge about the interaction between the children.[34] The daily observations that the teachers may have about the relationships of the child with peers, in the way of playing and communication, results in teachers being an important source of information, evaluation and referral to specialized evaluations. This suggests the need of requesting a report from the teachers in all processes of evaluation of development, which will allow for a more complete appreciation of the child. In only 2.4% of the population interviewed in this study was the physician the first person to suspect developmental difficulties, which resulted to be very close to what was reported by Hernández et al.[30] Although pediatricians have the opportunity to have regular contact with the children from birth, they fail to achieve a good effectiveness in identifying developmental problems.[4,34] This explanation could be related in part with the short duration of the office visits, with which they must comply with the institutional protocols and have little opportunity to address other concerns expressed by the family. In addition, it is most likely that their training leads them to be more attentive to the presence or absence of diseases and growth indicators than those of development. This is worrisome because pediatricians should be the first to point out the need for evaluations or specialized interventions. They are the specialist whom the parents trust and to whom they go to in cases of concerns or worries.

It is alarming that in the analyzed sample the majority of the growth and development controls did not achieve any detection. Only 13.6% of the children were referred to a professional or specialized evaluation or even noted the presence of some differences in development, but without proposing a specialized referral. These data suggest the need for training interdisciplinary teams so that in addition to measures related with the growth indicators, early detection of developmental disorders is promoted. In addition to the observation skills and to the training of professionals, the health care system constitutes a relevant variant. Care protocols of primary infancy and the services considered as basic and obligatory in each country outline the actions that they carry out. If evaluation of the child's development is not prioritized according to the care guidelines, the institutions providing the health services may deny or postpone carrying out evaluations or even endorse carrying out different types of therapies without first having a clear diagnosis for the child. As a backup for the need for a comprehensive assessment of the children, costs incurred by the health system for ignoring children with ASD and other developmental disorders should be investigated. The algorithm of practical parameters for screening and diagnosis of autism, proposed by Filipek et al.,[29] constitute a benchmark with empirical validation that should be considered.

The age at which it was begun to suspect some difference in the development in the evaluated sample was, on average, 1 year and 10 months with a minimum of 7 months and a maximum of 5 years of age. These data coincide with different authors.[29,30-37] For example, Martos-Perez claims that the appearance of the first symptoms occurs between 1½ years and 2 years of age.[32] In a similar manner, Hernández et al. point out that the age of suspicion is ~22 months.[30] Health professionals, therefore, should pay particular attention to the reports of parents or teachers about deviations

in development even before the first year of life. In particular, the importance of promoting a better understanding of social development and communication is highlighted because these tend to keep more in mind the milestones of motor and cognitive development with subsequent underestimation of their evolutionary deviations.

In the sample evaluated, the average age at time of diagnosis was 3 years and 1 month of age. This average is below that of 4 years and 4 months reported by Hernandez et al. as the average age for diagnosis of autism.[30] It should be kept in mind that the sample was obtained from an institute specialized in developmental disorders, so when a professional has a suspicion of ASD, the patient is rapidly referred and the process is not delayed. For this reason, it is a not a piece of data that is representative of the general population.

One noteworthy result is that the age at suspicion and of diagnosis does not differ in children who, at the time of evaluation, manifest classic autism or who are high functioning. This disagrees with findings by Filipek et al. who point out that the ages of suspicion and of diagnosis increase with an Asperger disorder because cognitive and communicative abilities would give reason to doubt the presence of a developmental delay.[29] This finding can be explained due to the size of the sample of the present investigation and because most of the patients were young children. It is to be expected that if the sample had a wider criteria, greater differences would be appreciated between the age at diagnosis of both groups, as occurs in the general population.

Regarding the number of professionals consulted, it was found that, on average, the families consulted with five professionals before receiving the diagnosis of ASD, and that it was greater in the cases of classic autism when compared with the professionals seen in cases of high functioning autism. This result is above what was expected because as revealed in the studies by Matson, the number of health professionals involved the diagnostic process was three or four.[28] It is probable that children with diagnosis of classic autism have contact with more professionals because its characteristics may be indicative of different disorders or comorbidities, which implies gathering concepts from different health professionals to obtain a more accurate diagnosis.

The process of detection and diagnosis results in being costly and painful. It would be ideal that in the evaluation carried out by health professionals, the recommendations proposed by various authors be kept in mind so as to decrease cost, time and effort during the diagnostic stage.[38-40] These recommendations include performing a detailed observation of the rhythm and particular behavior of each child, creating or reviewing developmental history by means of an interview with the caregivers, a medical review and measurement of cognitive, social and communicative abilities. Similarly, one must keep in mind the alarm signals that are detected by the parents from the early years.[41,42]

Among the most visited professionals are speech pathologists, psychologists, childhood neurologists and pediatricians. Sensitivity and training in ASD should, therefore, extend to different professionals and include the recognition of the ASD manifestations in their training. The pediatric neurologist is the specialist who makes the greatest number of diagnoses for ASD because in health entities this branch of medicine is delegated to the referral of children with developmental disorders for specialized treatments.

On average, children included in the present study received two different diagnoses before that of autism. The most common were ADHD, intellectual disability and developmental delay. This confirms the findings of other studies in which such presumptive diagnoses are the most common because of the frequent comorbidities among them and because at an early age they may be very similar.[43-45] It needs to be highlighted that for a process of detection and for early treatment, health professionals should understand the comorbidities of ASD with intellectual disability and developmental delay, although the interventions should be centered on the characteristics of autism. The differential diagnosis with ADHD may be difficult, but the social response is that which allows establishing the difference between both disorders, which implies having various sources of information in order to avoid an incorrect diagnosis.

The impact of receiving various diagnoses, for the family and for the child, should be taken into consideration: the parents for their part have greater difficulties in assuming and understanding the needs of their child, but also may begin to lose hope. Specifically, the concept received by 11% of the families that their child's symptoms could be explained by "poor upbringing," has a negative impact on the parents due to the feelings of guilt, anger

and bewilderment. This is important, keeping in mind that the present studies leave clear the neurobiological nature of the disorder and show the importance of upbringing in the process of controlling the child's behavior, but do not give it an etiological character in view of the clinical indicators that the child may present.

Additionally, it is the children who suffer the most damage when they receive other diagnoses because any intervention that is not centered on their needs will delay the possibility of any progress they may have, resulting in symptom exacerbation. Similarly, behind each erroneous diagnosis a series of interventions are generated, which translate into loss of time and money for the family as well as the inadequate use of human resources in health facilities.[46] This confirms the need to better train health professionals on the characteristics and critical factors of the different developmental disorders so as to avoid false negative results.

With regard to the tests suggested prior to diagnosis, it was found that neuropsychological tests have a greater probability of having abnormal results than neurological tests because in these tests the differences in the child's functioning can be evidenced, especially that of communication. The most suggested paraclinical tests were the hearing evoked potentials, EEG and MRI, which did not show changes in their results. The protocol that is internationally suggested for the diagnosis of autism includes screening tests for autism such as the M-CHAT,[35] specific tests for the diagnosis of autism such as the ADI and ADOS, and paraclinical tests to rule out comorbidities with other types of neurological disorders.[19]

Because neuropsychological evaluations can, in some cases, have results that are not indicative of an abnormality, it is necessary that the professionals not only carry out tests, but also observe and inquire about additional information that could lead to the detection of the ASD. We should keep in mind that the diagnosis of autism continues to be a clinical process in which the early detection has a significant impact on the quality of the life of those with the disorder.[47]

The areas in which changes are present leading to the parent's suspicion are related to three main areas: social, language development and motor development.[33-48] Alterations in the social areas highlighted by parents as warning signs significant to begin a diagnostic process include the presence of isolation and absent behaviors. These characteristics of social behavior confirm "passivity as temperamental trait" and disconnection, exposed by Rivière,[39] which are overlooked during a medical visit as they are evidenced in social environments, such as games and school situations.

Most parents were aware of differences in communication, whether due to absence of language because the child does not respond when called or because of sounds not characteristic of communication, which has also been reported by different authors such as Clifford et al.,[23] Rivière,[39] and the American Association of Psychiatry.[49] These authors highlight the difficulty to understand and evoke verbal and nonverbal language or the presence of stereotypical language and an abnormal prosody, which in turn affects symbolic games. For this reason, health professionals should ask parents or family members' questions that inquire about the interests the child has to use language in varied forms, i.e., to ask, share experiences, form an opinion and to respond. Once again the guidelines and tools most frequently used in the health system should be revised to do a follow-up on development because the presence only of vocabulary and the possibility of asking questions does not rule out the presence of an ASD.

In 52.4% of the cases, motor developmental delay was reported, data that would confirm that motor "clumsiness" is frequent in those with ASD.[50] There are no known studies that characterize motor differences in children with ASD, but it is clear that when there is clumsiness, delay or any difference in motor quality, health care professionals should not consider them in an isolated manner but as part of a more globally evolving condition.

Therefore, the warning signs appreciated by the parents should be very present in all developmental assessments, without minimizing them or attributing them to caregiver anxiety. Health professionals who have the responsibility for care of children should be alert when there are signs of evolutionary differences in more than one area. It is true that in many cases the parents could overlook or be in denial of the child's symptoms, which can also influence the delay in diagnosis, especially in healthy children without dysmorphisms. If the parents do not report specific worries during a brief office visit, they may be overlooked.[42] However, in the group studied, these cases were not present.

With respect to behavior, parental reports highlight the presence of aggressiveness, an aspect that coincides with what has been reported by Hernández et al.[30] who point out that it is common that families describe the existence of unjustified temper tantrums in their children. Although temper tantrums are not an inherent characteristic of autism, it is important that health care professionals inquire about the events that led to this problem in the child because catastrophic reactions to changes in the environment or frustrations are possibly an indicator of the presence of behavior rigidity.[51]

The analyses in this study have some limitations to consider. Sample size was small and is expected to be expanded in future studies. Data collection was made by means of a semi-structured interview; therefore, data are as a result of the ability of the mother to remember signs, data, and characteristics. Ideally, complementary information from medical records should be obtained, which would expand the overview of the process, the practices carried out and concepts received.

A worthwhile complementary analysis to carry out in future studies would be the procedures that families should carry out to achieve a specialized diagnosis for their child. Clinical practice shows that many must resort to legal action or personally pay for care due to delay, denial of services or referral to different therapies. Consequently, diagnosis is delayed or various diagnostic impressions are given, which results in confusion and distress for parents.

In short, parents and teachers are the first persons to suspect a developmental disorder at about 18 months of age. However, the diagnosis is often not received until 2 years later. For this reason the concerns of caregivers should be validated and include their reports in the protocols for the evaluation of the development of infants by health professionals. The most frequent symptoms of alarm for parents are lack of language, being absent and isolated, aggressive behavior and motor delay. Health care professional responsible for growth and development programs are not sensitive to appreciate the relevance of these characteristics, which delays the possibility of receiving the diagnosis of autism at an early age.

Families can visit up to five different professionals and receive between two and ten concepts, resulting in a relevant high cost, especially for the parents, but also for the health system. Results of this research suggest the need to strengthen the training of health professionals in areas such as psychology and developmental disorders. Likewise, early childhood intervention programs should modify their protocols for the evaluation of growth and development, taking into account clinical indicators and including validated practical parameters, as the proposal by Filipek et al.[29] and screening tools such as the M-CHAT.[35] This would encourage early detection and, therefore, early intervention, bases for a good prognosis of persons with ASD. At the same time, it would decrease the amount of professionals visited, cost, time of adjustment, acceptance of this reality and the anguish of the families during the diagnostic process.[52] Finally, it is encouraging to find that the age of diagnosis of children participating in this study was lower than that reported in other studies. This motivates moving forward with the hope of improving the opportunity for services and, especially, quality of life for these children and their families.[28] It should be taken into account that the importance of this intervention is based on the fact that these disorders are not neurodegenerative but, on the contrary, under appropriate conditions their symptoms can improve.[42-53]

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