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The sociodemographic and clinical profile of children with an autism spectrum disorder in the oriental region of Morocco

Bouchra Oneib*, Younes Fajoui and Fatima El Ghazouani

Abstract

Background: The objective of our study is to assess the clinical profile of autistic children in Morocco and the cultural perception of their parents. We collect data with a standard questionnaire on 130 children with autism spectrum disorder (ASD). They were recruited from child psychiatry consultation in the hospital for mental health from 2017 to 2019. This questionnaire assesses the socio-demographic characteristics of children and parents, personal and family medical history, the progress of pregnancy and childbirth. For each child, we determined the developmental age, signs of autism, the comorbidities, the nature of the treatment, the evolution. We complete the examination with parents' perception and attitude towards autism.

Results: The age of diagnosis was 3.4 years. The sex ratio in our study was 4.6. A low rate of children screened by general practitioners (4.6%). Language impairment was the main reason for the consultation, followed by social withdrawal and stereotypies. 75% of the children benefited from multidisciplinary care. The autism age of screening was significantly lower among families belonging to medium and high socioeconomic status ($F = 11.233$; $p = 0.001$).

Acceptance of diagnosis was present in 83% of cases, while 73.6% were involved in the care. Only 24% of parents thought that autism etiology is genetic, 75.4% notice improvement with age, and 80.2% consider it a source of family suffering.

Conclusions: These findings underscore the sociodemographic and clinical profile of children with ASD in the oriental region in Morocco. It could be relevant for early screening, intervention, and guidance for families with children having these conditions.

Keywords: Autism spectrum disorder, Children, Parents, Perception, Attitude, Culture

Background

Autism spectrum disorder (ASD) is an early-onset neurodevelopmental syndrome with a genetic component. Its clinical manifestations are so varied. According to the diagnostic and statistical manual of mental disorders version 5th edition (DSM5), ASD is characterized by persistent difficulties in communication and social interactions, the presence of stereotypical behaviors, and

restricted interests. The prevalence of ASD is estimated at 62/10000 children [1]. Boys seem to be affected more than girls, with a sex ratio of 1/5. Usually, the majority of these children are diagnosed at the age of 4 years. In general, children with more marked symptoms are diagnosed earlier than those with more subtle features. Its functional consequences make it quite a public health problem. Research now agrees that early intervention can achieve the best long-term results, which may change the developmental outcome of children and limit the disabling impact of some symptoms.

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The current situation in Morocco is difficult to assess due to the inaccessibility of early diagnosis, the cost of care and support, and above all, the lack of usable epidemiological data. The objective of our study is to assess the clinical profile of autistic children the cultural perception of their parents towards this disorder.

Methods

We conducted a descriptive cross-sectional study among children followed in child psychiatry consultation of the hospital for the mental health for ASD for approximately 2 years; 2017–2019. This center is the principal child psychiatry consultation site in the region.

To calculate the sample size, we took data from the High Commission for Planning in Morocco, which estimates that the number of children aged 1–12 years between 2017 and 2019 is 28151 [2]. As for the reference prevalence of autism, we took the world prevalence, which is 1.5% [3]. The sample size is estimated to be at least 105 children [4].

Inclusion criteria

We include in the sample any child aged less than 12 years diagnosed with ASD according to the DSM-5 criteria. The diagnosis was confirmed with a psychiatrist using an interview with parents and observation of the child (ADOS).

Exclusion criteria

We exclude teenagers and children aged over 12 years. Children had a diagnostic doubt or did not have a diagnosis of ASD. Parents refused to participate in the study and complete the questionnaire.

Data are collected from the parent interview, medical record data, and observation of the child.

Exploitation sheet

Data collection was carried out using an anonymous individual questionnaire.

We include in this questionnaire details about the socio-demographic data of the child (age, sex, origin); clinical and paraclinical data; similar cases in the family, signs favoring the request for care, the reason for consultation, age of screening, clinical signs, comorbidities, course of pregnancy, childbirth, and psychomotor development.

Also, we describe the management and the care proposed in the medical file and confirmed by the parents. We have precise the beginning of the treatment and if multidisciplinary (child psychiatrist, pediatrician, psychologist, educator, speech therapist, psychomotor therapist), and the evolution of children after the beginning of the care.

In the second part, we check the socio-demographic data of parents (age, parental consanguinity, level of education, socio-economic class, and profession). Besides, we search their personal and family history, as well as their attitudes and perceptions of their child’s disorder.

The data collection was done with the parents or one of them over a varying period of 20 to 30 min. We complete data from clinical records.

Ethical considerations

We obtained the approval of the ethics committee of the faculty of medicine and pharmacy of Oujda (CERBO) (N 02/2017, 08/06/2017).

We took for each child written parental consent before collecting data. We carried out this study with respect for patients’ anonymity and confidentiality of information.

Statistical analysis

Statistical analysis was performed by The Statistical Package for the Social Sciences (SPSS) version 13.0. (Released 2013. SPSS for Windows, Version 13.0. software. Chicago, SPSS Inc).

Categorical demographic variables were calculated in percentage, and for quantitative variables, means and standard deviation.

A search for associated factors to socio-demographic characteristics of parents and their attitude was made by using the Chi-square test or variance analysis. A $p < 0.05$ was considered significant.

Results:

Sociodemographic data of children (Table 1): we included in our study 130 children with autism. 82.3% were male, and 17.7% were female. The boy/girl sex ratio was 4.6. The mean age of the children at the first consultation at the hospital was 5.30 ± 1.85 years, with a range of ages of

Table 1 Sociodemographic characteristics of the child

Characteristics	n (N)
Age (years)	5.30 ± 1.85*
Gender	
Male	82.3 (82)
Female	17.7 (48)
Origin	
Oriental	92.3 (120)
Others	7.7 (10)
Similar case in family	
Yes	17.7 (48)
No	82.3 (82)

* Means ± standard deviation

2 and 12 years. One-quarter of sample (26.9%) of children are born from a consanguineous marriage.

The majority of participants (92.3%) were from the eastern region of Morocco. The diagnosis or screening of ASD was made before the consultation in 71.5% of children. The mean screening age was 3.4 ± 1.5 years (Table 2).

All mothers had radiological and biological follow-up during pregnancy, and 52% of mothers took drugs, mainly iron and vitamin supplements.

The indications for Caesarean section (in 30.8%) were mainly macrosomia, pelvic narrowing, and acute fetal distress, while 69.2% gave birth naturally (Table 3).

According to the medical records, genetic testing was performed in 14.2% of children. The electroencephalogram was performed in 27.1% ($n = 35$) of children. Radiological explorations were performed in 30.2% ($n = 39$) of the children. Thirty-five children (27.1%) benefited from EPA. Only 1.6% ($n = 2$) of the children benefited from VEP. The biological and metabolic assessment was requested in 10.2% of cases.

Care management: management was multidisciplinary in 73.1% ($n = 95$), mainly based on the ABA therapy (95.4%). This care involved the child psychiatrist (71.2%),

Table 3 Perinatal and psychomotor development

Variables	n% (N)
Preterm	2.3(3)
Full-term	127.7(127)
Neonatal distress	7.7(10)
Birth weight	3500 g \pm 870 g
Age of sitting	7 months
Age of walking	16 months
Being clean	
24–36 months	37(48)
> 36 months	28.4(37)
Not clean yet	34.6(45)
Language disorders (delay or absence)	87(113)
Rudimentary language	13(17)

the pediatrician (12%), the psychologist (6.4%), the educator (94.4%), the speech therapist (24.8%), and the psychomotor therapist (5.6%).

Sociodemographic characteristics of parents: mothers' age at conception was 28.2 ± 6.5 years with a minimum of 18 and a maximum of 44 years. The average age of the fathers was 36.7 ± 8 years old, with a minimum of 21 and a maximum of 56 years (Table 4).

Table 2 Clinical and comorbidities among children with autism

Variables	n% (N)
Age of diagnosis	3.4 ± 1.5 years
Screening made by	
Psychiatric or child psychiatrist	47.7 (62)
Pediatrist	25.7 (33)
Psychologist	13.3 (17)
General practitioner	6.2 (8)
Others (speech therapist, school...)	8 (10)
Request consultation made by	
Parents	93.1 (121)
Relatives	14.6 (18)
Teachers	6.9 (8)
Medical and paramedical staff	6.9 (8)
Main Reason for consultation	
Language disorders	90 (117)
Social withdrawal	69.2 (90)
Stereotypies	51.5 (67)
Self-aggression	16.9 (22)
Disorders of motor skills and posture	0.8 (1)
Comorbidities	11 (14)
Epilepsy	6.1 (8)
Genetic disorders	6.9 (9)
Confirmed (Down's syndrome)	2.3 (3)
Suspected	4.6 (6)
Mental retardation	6.9 (9)

Table 4 Sociodemographic characteristics of parents

Characteristics	n (N)
Age (years)	
Mothers	$28.2 \pm 6.5^*$
Fathers	$36.7 \pm 8^*$
Profession	
Mothers	
Yes	24.6 (32)
No	75.4 (98)
Fathers	
Yes	94.4 (122)
No	4.6 (8)
Education level	
Mothers	
Illiterate	8.5 (11)
Schooled	91.5 (109)
Fathers	
Illiterate	10.8 (14)
Schooled	89.2 (116)
Socioeconomic level	
Low	39.2 (51)
Middle	54.6 (71)
High	1.5 (8)

* Means \pm standard deviation

Parents' attitudes towards ASD: the majority of parents accept the diagnostic of ASD, and they believe that ASD is a source of family dysfunction (Table 5).

The autism age of screening was significantly lower among families belonging to medium and high socioeconomic status ($F=11.233$; $p=0.001$). In addition, parents in the middle socioeconomic classes do more autism research ($p<0.0001$).

We found that mothers educated think that autism is not curable ($p=0.01$) and cause family dysfunction ($p=0.01$). For the fathers, their level of education was related to beliefs of parental neglect ($p<0.0001$), curability ($p=0.01$), genetics of the disorder ($p=0.002$), and improvement with age ($p<0.0001$).

Parents' education was also associated with the following attitudes: refusal to undergo treatment ($p=0.043$), moving out ($p=0.003$), resigning from work to take care of the child ($p=0.04$), carrying out training or contact an association ($p=0.03, 0.02$), and bibliographic research ($p=0.02$).

Parents with psychiatric history believe in the genetic origin of ASD ($p=0.029$), not curable ($p=0.04$), and a cause of psychological distress. We found parents having autistic children with organic comorbidities influence their perception, especially parental neglect ($p=0.002$) and family distress ($p=0.017$) (Table 6).

Table 5 Perception and attitude of parents

Perception and attitude	n% (N)
Parents' attitudes towards ASD	
Accepting diagnosis	83.7 (108)
Deny the disease	16.3 (21)
Involved in the care	73.6 (95)
Refusing to undergo treatment	6.2 (8)
Prefer drug treatment	3.1 (4)
Alternative treatments	11.6 (15)
Moving out for healthcare	8.5 (11)
Autism association	68.2 (88)
Training in ABA or parental guidance	26.4 (34)
Bibliotherapy	54.3 (70)
Perception of ASD	24.6 (32)
Genetic disease	60.3 (78)
Parental negligence	23 (30)
Curable disorder	75.4 (98)
Positive progress	80.2 (104)
Source of family suffering (psychological distress and family dysfunction)	

Discussion

In our study, the sex ratio was 4.6. This result is comparable to the literature, which estimates the prevalence of sex ratio boys/girls of five [5]. Autism preferentially affects males with an average sex ratio of five boys to one girl. It remains relatively constant on average; it is most often between 2.5 and 4, but the extremes vary from 1.5 to 8.9 boys for a girl. This gender difference is considerable when autism is not associated with intellectual disability [6]. Recent research suggests that girls are underdiagnosed due to their different clinical pictures [7, 8].

The average age of diagnosis is 3.1 years, and the diagnosis of ASD was made with great certainty at age three [9]. Before this age, difficulties in social communication may be present, but characteristic behaviors and restrictions may not become evident until the age of three. In our study, the mean age of diagnosis was 3.4 years, which is consistent with the data in the literature. Studies report that the diagnosis of ASD after the age of three is reliable and stable over time, with agreement rates between 80 and 100%.

We found a significant difference between socioeconomic levels and the age of screening. This result is consistent with those of the literature. Socioeconomic level influences the age at first identification of ASD, and this is due to poorly balanced access and provision of care between different social classes. Numerous studies have explored whether socioeconomic status, as indicated by household income and parental education, is associated with the age of diagnosis, the severity of autism, and treatment.

Using the National Health Interview Survey (NHIS), Simpson and colleagues found that children with autism in single-parent households and those living in poverty were more likely to have emotional or behavioral difficulties [10].

Regarding the diagnostic process, Moh and Magiati reported that although parental education level and monthly income were associated with an earlier age of problem recognition, these factors did not affect nor association with other aspects of the diagnosis [11]. In another study, Hock and Ahmedani found that the rate of autistic children was correlated with low parental employment and high poverty levels [12].

In our study, there were 7.7% of the children had cousins or siblings with ASD. Studies have objectified a risk of twice as much if children have a cousin with ASD in the family [10].

A specialist doctor (child psychiatrist, pediatrician, and psychiatrist) made the diagnosis, in our study, in almost 95.9% of cases. We noticed that the rate of cases detected by general practitioners was low (6.2%). The lack of initial or continuous training, the lack of awareness, and the

Table 6 Correlations

Variables	Child gender (Male) N (%) p	Socio-economic status (medium) N (%) p	Education level(educated) Mothers Fathers N(%) p N(%) p	Psychiatric history (yes) N (%) p	Organic comorbidities (yes) N (%) p	Clinical signs (Language delay) N (%) p
Age of screening	3.3 ± 1.4 0.7	2.9 ± 1.5 0.001	3.73 ± 1.2 0.8	3.6 ± 1.34 0.69	3.5 ± 1.4 0.6	3.6 ± 1.34. 0.69
Parents' attitude						
Accepting diagnosis	74 (56.9) 0.2	61 (47) 0.8	33 (25.3)0.9 36 (27.7)0.09	37 (28.4) 0.5	4 (3) 0.4	80 (61.5) 0.2
Refusal to undergo treatment	4 (3)0.7	3 (2.3) 0.6	8 (6.1) 0.043	2 (1.5) 0.3	–	–
Bibliography research	–	53 (40.7) <0.0001	91 (70) 0.02	4 (3) 0.2	–	60 (46.1) 0.1
Moving out	–	7 (5.3) 0.8	10 (7.6)0.003	5 (3.8) 0.1	1 (7.6)0.9	–
Resigning from work	–	6 (4.6) 0.1	6 (4.6) 0.04 4 (3)0.09	5 (3.8) 0.2	–	–
Training or contact association	–	53 (40.7) 0.1	66 (50.7)0.03	6 (4.6) 0.23	–	70 (538) 0.09
Parents' perception						
Parents neglect	–	45 (34.6) 0.1	25 (19.2) 0.5 34 (26)0.0001	6 (4.6) 0.8	9 (6.9) 0.002	33 (25.3) 0.12
Not curable	–	54 (41.5) 0.6	35 (26.9)0.01 32 (24.6)0.01	15 (11.5) 0.04	–	–
Genetic disorder	–	20 (15.3)0.5	30 (23) 0.002	15 (11.5) 0.029	–	–
Improvement with age	22 (16.9) 0.32	59 (45.3) 0.7	40 (30.7) <0.0001	12 (9.2) 0.3	–	–
Source of family dysfunction	35 (26.9) 0.44	60 (46.1) 0.1	90 (70) 0.01	15 (11.5)0.02	10 (7.6) 0.017	–

referral of parents to specialized advice can explain this low rate. These results may also be because our study was carried out mainly in a hospital specializing in psychiatry and where the field of action of the general practitioner remains limited.

Parents and family circle mainly requested care. But, observation of teachers and general practitioners in health centers remains essential for the early detection and management of ASD.

In our study, the reason for consultation was language disorders (absence or delay), followed by social withdrawal and stereotypies. Speech and language development has been the most frequently reported concern in parents of children with ASD, especially that parents confound between language and social communication [9].

Indeed, many studies objected that parents mention these symptoms in decreasing order of frequency: delay or language disorders, abnormal social and emotional responses, a medical problem, or psychomotor delay. In one study, one hundred and fifty-three parents questioned were concerned about a language delay (77.8%) at 18 months on average; lack of attention to parents (34.6%) at 17 months on average; poverty of socialization

(29%) at 25 months on average. The most common concern of parents of 44 children is related to language development [9].

Drug intake during pregnancy was present in 52% of cases, mainly iron and vitamin supplements. Gestational nutrition has a potentially important role in the pathological development of autism due to its effects on neurobiological development during critical periods of central nervous system development [13].

According to a study published in the United States of America by public health and pediatric teams, iron deficiency during pregnancy increases the risk of autism in children. Recent data suggests that its supplementation may reduce the pediatric risk of autism spectrum disorders.

This study found that mothers of children with autism were less likely to have taken this supplement before and during pregnancy compared to women with healthy children. This risk mainly concerns women aged 35 and over who have had an iron deficiency. They are five times more likely to have a child with autism, obesity, hypertension, or diabetes [13, 14].

Several studies have shown the link between prematurity and ASD. These studies have found that prematurity

increases the risk of ASD [15]. Recent studies show an increased risk of ASD in cohorts of premature infants while putting it in perspective. The strong presence of neuro-motor, sensory and cognitive disorders in former premature babies make it difficult to distinguish between the lesional, psychopathological, or interactive part of relational and behavioral difficulties. Associated ASDs would be closer to the so-called syndromic forms or secondary to an organic pathology [13; 15].

30% of children were born by cesarean section in our study. Today, one in five women give birth by cesarean section [16]. A Swedish study of birth records found that children born by cesarean section were about 20% more likely to be diagnosed with ASD. These births by Caesarean section are more likely related to an unknown genetic or environmental factor that leads to an increased risk of cesarean section and ASD [17].

The average age of sitting in our study was seven months. The average age of walking was 16 months. 37% of children were clean between 24 and 36 months; 34.6% still were not. 87% of the children did not acquire the language.

Kanner's early autism accounts included descriptions of children having gross motor awkwardness, including a child who started walking [at age 2] without crawling or using chairs [17]. Since then, numerous studies have more generally underlined the potential role of the motor system in the development of ASD. In addition, retrospective studies have suggested a higher rate of late walking and other significant motor delays in children with ASD compared with the general population [18].

Early motor delays are considered a prodromal symptom of ASD, but they are not specific to ASD [18, 19].

50% of children with autism do not develop functional language, the likelihood that they do it after the age of five decreases with time [20].

11% of the children with autism in our study have organic or psychiatric diseases. This rate joins the data of literature, which varies from 10.7 to 77.4% [21].

In our Moroccan context, several factors make it difficult to carry out some assessments, such as the socio-economic level of the parents, the unavailability of some exams, particularly in the eastern region.

According to the literature, in pure autism without associated pathologies, the paraclinical assessment with normal results was found in more than 95% of cases.

The following paraclinical examinations were the most prescribed in children: EEG (27.1%), radiological explorations (30.2%), and PEA (27.1%). These examinations are included in the systematic assessment of a child with ASD. However, we must mention that the demand for these examinations in our daily practice is limited by several factors such as cost, availability of the examination,

long appointments to perform them, and the absence of a structure dedicated to this type of examination.

The treatment of ASD relies on a multidisciplinary approach and good coordination in obtaining services [21].

Almost 75% of the children in our study received multidisciplinary care. Morocco remains a country that suffers from poor coordination between the various stakeholders and the absence of a national plan for ASDs that will allow the unification of treatment protocols.

The mean age of mothers was 28.2 ± 6.5 years with a minimum of 18 years and a maximum of 44 years, while fathers' age was 36.7 ± 8 years with an extreme age was between 21 and 56 years. Several studies have linked advanced maternal and paternal age to an increased risk of ASD [22–25]. Theories reporting the association between parental age and an increased risk of ASD include the potential for more genetic mutations in the gametes of older fathers and mothers. Other factors could favor ASD in children of older mothers like unfavorable environment in utero, a higher risk for chronic diseases, with more obstetric complications such as low birth weight, prematurity, and cerebral hypoxia [23, 24].

Younger mothers (aged less than 35 years) and fathers (less than 40 years) had a low risk of having a child with autism, about 10 to 20% less risk than older women and men. Indeed, higher maternal and paternal age was associated with a 41% and 55% increased risk of autism, respectively [22].

In our sample, 26.9% of the children are born from a consanguineous marriage. A study carried out in Rabat found 23% of inbreeding cases in their results ($n=53$ and $n=90$) [26]. According to the Department of Medical Genetics of the National Institute of Hygiene, the rate of consanguinity in Morocco is high, with an estimated prevalence of 15.25%. The department believes that this high rate of inbreeding in Morocco can be attributed to a strong belief in the socio-cultural benefits of these marriages. However, this rate of inbreeding is decreasing among the younger generations. This trend is explained by several factors, including the decrease in the number of descendants per family, the improvement in the educational level of women, the adoption of the nuclear family system, the displacement from rural to urban areas, and improved socio-economic status. We must also note an increase in the proportion of female civil servants and an awareness of the consequences of consanguineous marriages on infant morbidity and mortality [27].

Mamidala and colleagues found that inbreeding was assessed as an independent risk factor for the development of ASD. This study recruited 500 children with ASD and had four inbreeding profiles, including first cousins, uncle-niece, and double first cousins. The results revealed

that ASD cases significantly increased inbreeding rates compared to controls, with an overall risk factor of 3.22% when parents were consanguineous [28].

Likewise, in a more recent publication, Guisso explored the association between pregnancy/birth complications and autism spectrum disorder (ASD) in a Lebanese group where inbreeding rates are high. The risk factor for the development of ASD in this study was 2.5. The results of these studies confirm the role of inbreeding on the pathophysiology of ASD [29].

According to epidemiological studies, autism occurs in all social classes [30–33]. In our series, we found that all three social statuses were affected.

Our data showed no difference between the socio-economic level, the attitudes, and the parents' perceptions towards their child's ASD except for the literature search. The data in the literature are quite controversial on this subject. Some authors conclude that parents with a high socio-economic level are more involved. However, other authors report that the socio-economic level alone can not influence the parents' attitude. Indeed, other factors have to be considered, such as the cultural context and parents' education [30, 33].

In our study, we found that parents suffer significantly from the burden of ASD. The socio-economic level is linked to the parents' perception of family suffering due to the financial burden of the disorder (travel for care; resignation from work, costs of rehabilitation, siblings) [32].

Parents' level of education influences the parents' awareness for better use of family and community resources. It helps them obtain more up-to-date information on childcare, the state of development of the children, and the appropriate use of medical resources for diagnosis [34–37].

Zuckerman found that poor parents with a low level of education were more likely to perceive their children's condition as a mystery and less likely to feel able to change the condition. Education and poverty were associated with disparities in health service delivery [34].

We demonstrated in our results an association between parents' educational level and their attitudes towards their child's ASD, such as refusal to undergo treatment, moving parents, resigning from work, carrying out training, and bibliographic research.

These finds correlate with data from the literature. Indeed, education affects parental attitudes through their ability to communicate their emotions, cope with stressful events, and solve problems [35].

We found that the mother's educational level was associated with the following perceptions: curability, family suffering. The father's perception, such as the genetics of the disorder, parental neglect, curability,

and improvement with age, was correlated with the education.

The association between educational level and perceptions has been extensively studied in the literature. Education influences the parents' perceptions. Indeed, parents with a high level of education ask more questions about their child's disorder, do more research, request information from professionals, which lets them, react positively to their child's disease [37].

Nevertheless, other authors have reported that a high level of education increases the risk of anxiety in parents (more aware about their children) [37, 38].

In our study, 83.7% of parents accepted their child's diagnosis of ASD. The socio-economic and intellectual level of the parents influences the acceptance of the diagnosis. Indeed, parents with a high educational level can easily accept the diagnosis [39–42].

Involvement in care was the case for 73.6% of parents. For the remaining 26.4%, we can relate them to the denial of the diagnosis but continue to consult given the behavioral disorders or the language delay of their children. 6.2% refuse to follow treatment. This refusal can be related to the culture of the parents. Currently, these parents try alternative treatments (diets, traditional treatments) for their children, and this is the case in 11.6% of parents questioned in our study. This choice is affected by the cultural context, the despair following the non-improvement of the clinical state.

In our study, 4.7% of mothers stop working to look after their child and become available for the long and heavy course of care. 8.5% of parents found themselves forced to move to approach health centers, parents' associations, and the support of large families. 26.4% of parents have received training, mainly offered by associations. This percentage remains insufficient, explained by the lack of intervention aimed at parents of children with ASD.

Bibliographic research remains a solution for parents (54.3% in our study) to find answers to their questions and concerns when faced with the non-satisfaction of offered care (little listening, not control, lack of confidence, lack of intervention directed towards parents). This knowledge can influence how parents view autism. In 2007, a study conducted by Rhoades, Scarpa, and Sallee showed that only 20% of parents said that health professionals provided them with information about autism after their child's diagnosis [32]. In contrast, over 70% of parents surveyed indicated they had used books, magazines, videos, and the internet to learn about autism.

A quarter of parents (25%) said they lack objective knowledge about autism. Regarding the etiologies of autism, parents more strongly believed that it was due to negligence on their part (60.3%). This high percentage could be related to the feeling of guilt felt by the parents

(exposure to television, not giving the child his time). This perception could affect parents with a significant stress load, low self-esteem, and depression.

24% of parents believed that ASD was due to genetic reasons similar to what an American study found in 71 American parents. However, Mercer found 90% of Canadian parents among the 41 questioned thought about the genetic theory of the disorder [43]. This perception of genetic etiology was declining in non-Western societies, a study in Iran, which found a rate of 7% [44].

80.2% of parents agreed that ASD was a source of family suffering, this can explain by parental stress, stigmatization (family meetings, at the market, in the street), the change of lifestyle, the daily difficulties of coping with the disorder, and finally the lack of support.

Finally, we can say that the cultural context influences parents' perceptions of ASD and will affect parents' choice of therapies for their autistic children. Kim did a comparative study with families of children with ASD in three different countries (Canada, Nicaragua, and Korea). He found that perception of ASD is different and depends on culture. That suggests doing more research in this direction [45].

We can summarize the limits of this study in three points:

Recall bias: Part of the recruitment of data (psychomotor development, pregnancy progress, and childbirth) is based on the parents' memories.

The health records were severely lacking in information, birth weight, and psychomotor development.

Regarding attitudes and perceptions, they were noted just at t moment, although we know very well that they change as the care process progresses.

Conclusion

Our study revealed that the socio-economic level impacts the age of screening. Also, the parents' education influences their perception and adherence to care.

These findings could be relevant for early screening, intervention, and guidance for families with children having these conditions.

Abbreviations

ASD: Autism spectrum disorder; DSM-5: The diagnostic and statistical manual of mental disorders version V; EEG: Electroencephalogram; AEP: Auditory evoked potentials; VEP: Visually evoked potential; NHIS: National Health Interview Survey.

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Authors' contributions

The authors (BO) and (FG) contributed in conception, design of the work, and acquisition of data. The authors BO and YF contribute in acquisition, analysis and interpretation of data and they have drafted the work and approved the submitted version. The authors read and approved the final manuscript.

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Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

We obtained the approval of the ethics committee of the faculty of medicine and pharmacy of Oujda (CERBO), N 02/2017, on 08/06/2017.

Data collection was made after written parental consent for each children. We carried out this study with respect for patients' anonymity and confidentiality of information.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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