

Overview of Risk Factors in Children with Autism Spectrum Disorders (ASD) at SLB Negeri 1 Makassar

Firjatullah Feniah Sabir*, Raully Ramadhani, Najamuddin Andi Palancoi, Ulfah Rimayanti, Abd.Rahim Yunus

Fakultas Kedokteran dan Ilmu Kesehatan, Universitas Islam Negeri Alauddin, Makassar, Indonesia

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*Author correspondence:

*Correspondence of the author:

Name: Firjatullah Feniah Sabir

Institution: Faculty of Medicine and Health Sciences, Alauddin State Islamic University, Makassar

Address: Campus 1, Jl. Sultan Alauddin No. 63 Makassar, South Sulawesi, Indonesia

Email: feniabsabiir@gmail.com

ABSTRACT

Autism Spectrum Disorder (ASD) is a developmental disorder of the nervous system that can occur from birth or infancy. Children with ASD have difficulty developing social relationships with others. This autism condition affects social interaction, communication, and behavior that is seen before the child reaches the age of 3 years. The purpose of this study was to describe the risk factors in children with GSA at SLB Negeri 1 Makassar. This study employs a descriptive cross-sectional approach to investigate risk factors in children with GSA at SLB Negeri 1 Makassar. This research was conducted at the Makassar State SLB 1 Educational Institution from January 04 to January 24, 2023. The total number of samples in this study was 61, which fit the inclusion and exclusion criteria. Data processing and analysis were computerized using SPSS 20.0. The majority of children had genetic factors (59.0%). The age of the father when the mother conceived the child was highest in the 29-30 year age category, and the age of the mother when she conceived the child was highest at 32-34 years. Most mothers' education was found to be at the high school level (60.7%). Almost all mothers had a history of passive smoking (90.2%). No mother had a history of exposure to pesticides, alcohol consumption, consumption of antidepressant drugs, or consumption of anti-epileptic medications. Almost all mothers had no history of preeclampsia (90.2%). Most had a history of preterm (67.0%) and LBW (55.7%). Almost all children had a history of asphyxia (95.1%). Most children had a history of febrile seizures (70.5%). Risk factors that are commonly found in children with GSA in SLB Negeri 1 Makassar are genetic history, father's age is 29-30 years and mother's age is 32-34 years, history of high school education, history of passive smoking, history of prematurity, history of LBW, history of asphyxia and history of febrile seizures.

Introduction

Autism is a condition present from birth or infancy that affects a person's ability to interact socially or communicate normally. Linguistically, the word "autism" comes from the Greek word meaning "alone." This is because autistic children generally live in their world, enjoy solitude, and are unwilling to be approached by anyone other than their parents.¹

Neurologically, autism can be defined as a condition in which a child experiences impaired

brain development, particularly in the areas of language, social skills, and imagination. These impairments are what distinguish autistic children from other children. They seem to live in their world, oblivious to their surroundings. Ironically, many people misunderstand autistic children. They are considered crazy, insane, and extremely dangerous, thus isolating them from other human life and receiving undivided attention.²

Based on data from the World Health Organization (WHO) reports, an estimated 1 in

160 children worldwide, including in Asia, Europe, and North America, have ASD. Based on the report, the Centers for Disease Control and Prevention, in 2018, approximately 1 in 44 children in the United States were diagnosed with ASD. *United Nations Educational, Scientific and Cultural Organization* (UNESCO) reported the incidence of ASD in Asia, especially Hong Kong, with a prevalence of 1.68 per 1000 for children under 15 years of age who were diagnosed.^{3,4.}

Indonesia currently has a population of approximately 270.2 million, with a population growth rate of roughly 3.2 million children with autism. The Special Needs School Statistics Data Center recorded 144,621 students with autism in Indonesia in the 2020/2021 academic year. This figure is an increase compared to the 2019/2020 academic year, which recorded 144,102 students with autism. According to data from the Ministry of Education and Culture in 2021, there were 10 provinces with the highest number of students with ASD, with South Sulawesi ranking 9th in the 2020/2021 academic year, with 4,559. In Makassar, the prevalence of children with ASD in the 18-month-to-6-year age group was 1.69% in 2018. A preliminary study conducted at SLB Negeri 1 Makassar in 2022 recorded 308 children with special needs. A total of 61 children experienced ASD.^{5,6}

People with autism tend to self-injure, lack self-confidence, act aggressively, become indifferent or even overly responsive to external stimuli, and exhibit unnatural behaviors, such as clapping their hands, making repetitive sounds, or engaging in incomprehensible body movements. These behaviors often stem from a lack of ability to communicate their desires and expectations to others and are also attempts to relieve stress.¹

Autism or *Autistic Spectrum Disorder* (ASD), the exact cause is still unknown. However, there are now several effective steps for people with autism to improve their social, behavioral, and communication skills.⁷

The exact cause of ASD is unknown, but some studies believe environmental and genetic influences contribute to its occurrence. Environmental factors contributing to ASD are divided into three periods during pregnancy: prenatal, perinatal, and neonatal.⁸ Scientists say autism is caused by a combination of factors, including genetics. Genetic factors suggest that the increasing number of people living with ASD could be linked to rare inherited genetic changes or mutations, leading to the identification of more candidate genes. In addition to a few specific single genes linked to autism, current theories also support polygenic inheritance, meaning multiple genes are likely involved in predisposing someone to developing autism⁹.

Other risk factors such as parental age, educational history, smoking history, history of exposure to pesticides, history of alcohol consumption, history of antidepressant drug consumption, history of antiepileptic drug consumption, history of infection during pregnancy, history of antepartum hemorrhage, history of preeclampsia, history of prematurity, history of low birth weight (LBW), history of asphyxia, history of febrile seizures, history of vaccination *measles, mumps, rubella* (MMR).⁹

In Indonesia, extensive research has been conducted on the incidence of ASD in children. However, research examining risk factors and their relationship to ASD is still scarce. Based on this, researchers are interested in examining "A Description of Risk Factors in Children with Autism Spectrum Disorder (ASD) at SLB Negeri 1 Makassar in 2022."

Methodology

This study is a descriptive study with a cross-sectional approach that describes the risk factors in children with ASD at SLB Negeri 1 Makassar. The population in this study was all mothers who had children with ASD at SLB Negeri 1 Makassar on August 4, 2022, namely 308 female students. The total number of children with ASD was 1.5. Sampling: A total of 61

samples were obtained that met the inclusion and exclusion criteria.

Research result

1. Univariate Analysis

a. Respondent characteristics

Table 1: Frequency Distribution of Age of Children with ASD at SLB Negeri 1 Makassar

Child Age	Frequency	Percentage (%)
7 Years	2	3.3
8 Years	8	13.1
9 Years	11	18.0
10 years	9	14.8
11 years old	11	18.0
12 years old	3	4.9
13 years old	4	6.6
14 years	3	4.9
15 years	3	4.9
16 years	6	9.8
17 years	1	1.6
Total	61	100

Table 1.1, the frequency distribution for the age of children with the most GSA shows that the most common ages are 9 years and 11 years, with 11 cases (18.0%). At the same time, the frequency distribution of the age of children with the lowest GSA at the age of 17 years shows that as many as one child has a GSA (1.6%). The rest, at the age of 7 years as many as 2 children with

GSA (3.3%), at the age of 8 years as many as 8 children with GSA (13.1%), at the age of 10 years as many as nine children with GSA (14.8%), at the age of 12, 14 and 15 years as many as 3 children with GSA (4.9%), at the age of 13 years with four children with GSA (6.6%) and at the age of 16 years as many as 6 children with GSA (9.8%).

Table 1.2 Frequency Distribution of Gender of Children with ASD at SLB Negeri 1 Makassar

Gender	Frequency	Percentage (%)
Man	51	83.6
Woman	10	16.4
Total	61	100

Table 1.2 shows the frequency distribution of the gender of children with ASD, with 51 children (83.6%) being male. Meanwhile, 10 children (16.4%) were female.

b. GSA Risk Factors

Table 1.3 Distribution of Genetic Frequency in Children with ASD at SLB Negeri 1 Makassar

Genetics	Frequency	Percentage (%)
Of	36	59,0
No	25	41,0
Total	61	100

Based on Table 1.3, the frequency distribution for those with the highest genetic history is 36 respondents (59.0%), while the frequency distribution for those with the lowest genetic history is 25 respondents (41.0%).

The results of this study are in line with research conducted by Anggriani et al. (2020), which found a significant relationship between family history and the occurrence of GSA with a P value of 0.001.¹⁰

Chromosome studies have shown a genetic link to ASD. Some studies indicate that 2 to 4% of relatives of people living with ASD also have ASD. The incidence of ASD increases in families with a history of ASD.^{11,12}

Table 1.4 Frequency Distribution of Father's Age When Mother Was Pregnant with a Child with ASD at SLB Negeri 1 Makassar

Age Dad Moment Pregnant Mother	Frequency	Percentage (%)
25-26 Years	1	1.6
27-28 Years	4	6.6
29-30 Years	15	24.6
31-32 Years	9	14.8
33-34 Years	8	13.1
35-36 Years	14	23.0
37-38 Years	2	3.3
39-40 Years	6	9.8
41-42 Years	2	3.3
Total	61	100.0

Based on table 1.4 shows the frequency distribution of father's age when the mother was pregnant with a child with the highest GSA in the age range of 29-30 years as many as 15 respondents (24.6%), while the frequency distribution of father's age when the mother was pregnant with a child with the lowest GSA in the

age range of 25-26 years as many as 1 respondent (1.6%). This study aligns with Sari et al. (2022), who found that the father's age group, specifically the age range of 29-34 years, was represented by as many as 35 respondents (36.1%).¹³

Reichenberg et al stated that the relationship between paternal age and autism is due to spontaneous mutation. again, which is related to the increasing age of spermatogonia or influenced by socio-cultural environmental factors.¹⁴

Table 1.5 Frequency Distribution of Mothers' Age When Pregnant with Children with ASD at SLB Negeri 1 Makassar

Maternal Age at Pregnancy	Frequency	Percentage (%)
20-22 Years	2	3.3
23-25 Years	4	6.6
26-28 Years	11	18.0
29-31 Years	15	24.6
32-34 Years	19	31.1
35-37 Years	5	8.2
38-40 Years	5	8.2
Total	61	100.0

Table 1.5 shows that the frequency of maternal age when pregnant with a child with ASD was highest in the age range of 32-34 years, with 19 respondents (31.1%). While the frequency distribution of maternal age when pregnant with a child with ASD was lowest in the age range of 20-22 years, with 2 respondents (3.3%). The results of this study align with the research of Sari et al. (2022) among mothers, specifically in the age range of 29-34 years, with 36 respondents (37.1%).¹³

Meta-analysis studies indicate that older parents at the time of birth have a higher risk of

having a child with ASD. Increasing maternal age is thought to be associated with the risk of chromosomal abnormalities in egg cells or trinucleotide instability.¹⁴

Table 1.6 Frequency Distribution of Educational History of Mothers of Children with ASD at SLB Negeri 1 Makassar

Educational History	Frequency	Percentage (%)
SD	2	3.3
JUNIOR HIGH SCHOOL	9	14.8
SMA	37	60.7
Masters	13	21.3
Total	61	100

Based on Table 1.6, the highest maternal education level was high school (37 respondents) (60.7%), while the lowest maternal education level was elementary school (2 respondents) (3.3%). The remaining respondents were junior high school (9 respondents) (14.8%), and mothers with a bachelor's degree (13 respondents) (21.3%). This indicates that mothers with a high school education are more likely to be risk factors for ASD in children. A study by Ruminem (2020) found no significant association between educational level and the incidence of autism ($p = 0.79 > 0.05$).¹⁵

Table 1.7 Distribution of Smoking History in Mothers of Children with ASD at SLB Negeri 1 Makassar

Smoking history	Frequency	Percentage (%)
Passive	55	90.2
Active	6	9.8
Total	61	100

Based on Table 1.7, the highest frequency distribution of mothers smoking was among mothers with passive smoking, amounting to 55 respondents (90.2%), while the lowest frequency distribution of mothers smoking was among mothers with active smoking, amounting to 6 respondents (9.8%).

In a study conducted by Affandi et al. (2014), cigarette exposure was not associated with the incidence of autism ($p = 1.000$). This likely occurred because the number of samples exposed in this study was very small, specifically six people. The results of this study are in line with research conducted by Nurbayatin et al. (2015), which found that almost half of pregnant women were passive smokers, with a total of 17 pregnant women who were passive smokers (34%). There was no significant relationship between pregnant women who were passive smokers and AAS ($P = 1.000$).^{16,17}

Exposure to secondhand smoke inhaled by pregnant women is just as dangerous as direct smoking. Cigarette smoke contains nicotine, a vasoconstrictor that causes vasoconstriction of blood vessels, increasing heart contractions. Consequently, it affects the supply of oxygen and nutrients to the fetal heart. This results in inadequate oxygen supply to the fetus, which can lead to hypoxia and impaired fetal growth. Furthermore, decreased nutrient supply can lead to malnutrition and impaired fetal growth.¹⁸

Table 1.8 Frequency Distribution of History of Exposure to Pesticides in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Pesticide Exposure	Frequency	Percentage (%)
Of	0	0
No	61	100
Total	61	100

Based on Table 1.8, the frequency distribution of mothers who were not exposed to pesticides was 61 respondents (100%). The results of the study on pesticide risk factors in children with ASD were not found in all mothers. However, research conducted by Juanda et al. (2020) stated that the presence of chemicals such as pesticides that have an EDC effect or have antithyroid properties is also a factor causing autism. Some types of pesticides that have an EDC effect include 2,4-dichlorophenoxyacetic acid (2,4-D), mancozeb, acetochlor, aminotriazole, aminotrole, bromoxynil, pendamethalin, and thiourea.¹⁹

Table 1.9 Frequency Distribution of Alcohol Consumption History in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Alcohol Consumption	Frequency	Percentage
Of	0	0
No	61	100
Total	61	100

Based on Table 1.9, the frequency distribution of mothers who do not consume alcohol is 61 respondents (100%).

The study found that a history of alcohol consumption during pregnancy was a risk factor, with a zero percent. This finding aligns with Nisa's (2020) study, which found no association between a history of alcohol consumption and the occurrence of disabilities in children at Pelangi Holistic Inclusion School in Pekalongan City, as indicated by a P-value of 0.468.²⁰

Table 1.10 Frequency Distribution of History of Antidepressant Drug Consumption in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Antidepressant Drug Consumption	Frequency	Percentage (%)
Of	0	0
No	61	100
Total	61	100

Based on Table 1.10, the frequency distribution of mothers who did not take antidepressant drugs was 61 respondents (100%).

Research findings indicate that there is no risk factor for a history of taking certain medications, such as antidepressants, during pregnancy. A study conducted by Alfinna (2019) found a significant association between a history of antidepressant use during pregnancy and childbirth and ASD in children in Kota Tangerang. Semarang (P 0.001; OR = 20.06), this means that mothers who have a history of consuming antidepressant drugs have a 20 times greater risk of giving birth to children with ASD compared to mothers who do not have a history of consuming antidepressant drugs.²¹

Table 1.11 Frequency Distribution of History of Antiepileptic Drug Consumption in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Antiepileptic Drug Consumption	Frequency	Percentage (%)
Of	0	0
No	61	100
Total	61	100

Based on Table 1.11, the frequency distribution of mothers who did not take antiepileptic drugs was 61 respondents (100%).

The study found that the risk factor for a history of antiepileptic drug use during pregnancy was zero. This finding aligns with a survey conducted by Manalu (2013), which found that the percentage of mothers with a history of taking drugs such as misoprostol and valproic acid was 0%. Almost all respondents reported taking vitamins during pregnancy. Valproic acid can cause somatic malformations, such as neural tube defects.^{8,22}

Table 1.12 Frequency Distribution of History of Infection During Pregnancy in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Infection During Pregnancy	Frequency	Percentage (%)
Of	8	13.11
No	53	86.98
Total	61	100

Based on Table 1.12, the frequency distribution of mothers who did not experience infection during pregnancy was 53 respondents (86.89%), and the frequency of mothers who experienced infection during pregnancy was 8 respondents (13.11%).

The results of this study are inconsistent with those of Fibriana et al. (2017), who conducted research in Semarang City and found a significant association between maternal infection during pregnancy and the incidence of ASD, with a P value of 0.006 ($P < 0.05$). The association between early childhood infections and autism has also been investigated. Several studies have suggested a sudden onset of autism after herpes encephalitis. Other diseases that can cause secondary hydrocephalus, such as meningitis, also contribute to autism, although case reports are still limited.²³

Table 1.13 Frequency Distribution of History of Antepartum Hemorrhage in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Antepartum Hemorrhage	Frequency	Percentage (%)
Of	0	0
No	61	100
Total	61	100

Based on Table 1.13, the frequency distribution of mothers who did not experience antepartum bleeding was 61 respondents (100%).

This study aligns with Affandi et al.'s (2014) study, which found no association between antepartum hemorrhage and autism ($p = 0.640$). However, it was more closely linked to preterm birth and low birth weight (LBW), which in turn may be associated with ASD. Conversely, this study disagrees with Lubis's (2017) study, which found antepartum hemorrhage increased the risk of ASD ($P=0.002$).^{16,24}

Table 1.14 Frequency Distribution of History of Preeclampsia in Mothers of Children with ASD at SLB Negeri 1 Makassar

History of Preeclampsia	Frequency	Percentage (%)
Of	6	9.8
No	55	90.2
Total	61	100

Based on Table 1.14, the distribution of frequency data for mothers who did not experience preeclampsia was 55 respondents (90.2%), and the frequency of mothers who experienced preeclampsia was 6 respondents (9.8%).

This finding aligns with research conducted by Alfinna (2019), which found that 13 people (29.5%) experienced preeclampsia, while 31 people (70.5%) did not. Based on the results of bivariate analysis, it shows that there is a significant relationship between a history of preeclampsia and the incidence of ASD in children in Semarang City ($p = 0.031$; $OR = 4.2$), this means that mothers who have a history of preeclampsia are at 4.2 times greater risk of giving birth to children with ASD compared to mothers who do not have a history of preeclampsia.²¹

Table 1.15 Frequency Distribution of History of Prematurity in Children with ASD at SLB Negeri 1 Makassar

Premature History	Frequency	Percentage (%)
<37 Weeks	24	39.3
>37 Weeks	37	60.7
Total	61	100

Based on Table 1.15, the frequency distribution of children born prematurely is highest at the age of >37 weeks, with 37 respondents (60.7%), while the frequency distribution of children born prematurely is lowest at the age of <37 weeks, with 24 respondents (39.3%).

Abnormal gestational age is more common in the birth of children who later develop autism. Pregnancy at 35 or 42 weeks is classified as abnormal, and there is a significant association with autism risk.²⁵

Table 1.16 Frequency Distribution of LBW History in Children with ASD at SLB Negeri 1 Makassar

History of low birth weight babies	Frequency	Percentage (%)
<2500 g	27	44.3
>2500 g	34	55.7
Total	61	100

<2500 g	27	44.3
>2500 g	34	55.7
Total	61	100

Based on Table 1.16, the frequency distribution of low birth weight babies is highest with a weight of >2500 grams, with 34 respondents (55.7%), while the frequency distribution of the lowest birth weight babies is with a weight of <2500 grams, with 27 respondents (44.3%).

The results of this study are consistent with research conducted by Hultman et al. (2012), which found that 86% of infantile autism cases were born weighing >2500 grams. Although these results indicate that the majority of children with ASD in this study had normal birth weights, this is inconsistent with existing Theory. This may be because the sample size obtained was only the minimum sample size to describe the risk factors for children with ASD at SLB Negeri 1 Makassar. Therefore, further research using statistical analysis is needed to determine whether birth weight is a risk factor for ASD or not at SLB Makassar City.⁷

Table 1.17 Distribution of History of Asphyxia in Children with ASD at SLB Negeri 1 Makassar

History of Asphyxia	Frequency	Percentage (%)
Of	3	4.9
No	58	95.1
Total	61	100

Based on Table 1.17, the distribution of frequency data for children who did not experience asphyxia was 58 respondents (95.1%), and the frequency of children who experienced asphyxia was 3 respondents (4.9%). The results of this study are in line with research

conducted by Affandi (2014), with the number of children who did not experience asphyxia being 20 people (34.4%) and those who experienced asphyxia being 9 people (15%).¹⁶

Table 1.18 Distribution of Frequency of Febrile Seizure History in Children with ASD at SLB Negeri 1 Makassar

History of Febrile Seizures	Frequency	Percentage (%)
Of	18	29.5
No	43	70.5
Total	61	100

Based on Table 1.18, the frequency distribution of children without a history of febrile seizures was 43 respondents (70.5%), while the frequency distribution of children with a history of febrile seizures was 18 respondents (29.51%).

The results of this study are consistent with those of Affandi et al. (2014), which found that 12 people (20.6%) had a history of febrile seizures, while 17 people (29.3%) did not. In the study conducted by Affandi et al. (2014), a history of febrile seizures was assessed as being associated with the incidence of autism ($p=0.019$).¹⁶

Conclusion

Based on research describing risk factors in children with Autism Spectrum Disorder (ASD) at SLB Negeri 1 Makassar, genetic predisposition appears to be a significant factor, with 59.0% of children having a genetic history. Parental age also showed a notable distribution, with fathers most frequently aged 29-30 years and mothers aged 32-34 years during pregnancy. Additionally, maternal education was predominantly at the high school level (60.7%),

and a large majority of mothers (90.2%) were exposed to passive smoking.

The study further indicates that several other factors were largely absent among the mothers of children with ASD, including exposure to pesticides, alcohol consumption, and histories of taking antidepressant or antiepileptic drugs (all 100% did not have these exposures). Similarly, most mothers did not experience infections during pregnancy (86.9%), antepartum bleeding (100%), or preeclampsia (90.2%). Birth-related factors such as prematurity (60.7% born at >37 weeks), low birth weight (55.7% at >2500 grams), asphyxia (95.1% did not experience), and febrile seizures (70.5% without a history) were also predominantly not present, suggesting these are less frequent risk factors in this particular study population.:

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