



# Mother's Knowledge of Gluten and Casein Free Diet on Children with Autism Spectrum Disorder (ASD) and Its Application During COVID-19 Pandemic

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**Abstract.** Autism Spectrum Disorder (ASD) is a complex developmental disorder that includes the way a person communicates, relates, and behaves. During the COVID-19 pandemic, ASD is one of the groups that is vulnerable to being infected with COVID-19, so it requires special attention. ASD children have different nutritional needs than normal children because ASD children have organ dysfunction and digestive enzymes. The Gluten Free Casein Free Diet (GFCF) has been shown to be of help in improving learning, cognitive function and communication skills in children with autism. Mother's knowledge has an important role in determining the quality of children's nutritional intake including gluten and casein-free diet. This study aims to describe the knowledge of mothers about a gluten and casein-free diet in ASD children and its application during the COVID-19 pandemic in Yogyakarta, Indonesia. This study used a cross sectional study design with a purposive sampling of 37 subjects in special schools and autism therapy around Yogyakarta, ID. The results showed that most of the mothers had good knowledge about a gluten and casein free diet (86.49%). Some mothers have also received information about gluten and casein-free diets (83.78%) and most of the sources of information came from the internet. The majority of ASD children in this study were still consuming foods containing gluten (86.49%) and casein (67.57%) during the COVID-19 pandemic.

**Keywords:** Autism · Gluten and casein free diet · Mothers knowledge · COVID-19

## 1 Introduction

Autism Spectrum Disorder (ASD) is a complex developmental disorder that includes the way a person communicates, relates, and behaves [1–3]. The World Health Organization (WHO) predicts cases of autism will occur in 1 in 160 children worldwide. ASD cases every year are predicted to increase every year. In 2018 the Indonesian Ministry of

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Women's Empowerment and Child Protection, on its official website, predicts there are as many as 2.4 million children with autism in Indonesia with the addition of 500 new children each year. The Special School Statistics Data Center of the Indonesian for 2015–2020 noted that the number of ASD in Indonesia reached 5,187 cases in inclusive schools and 11,976 cases in special schools.

ASD children have different nutritional needs than normal children generally because ASD children have organ dysfunction and digestive enzymes so they often experience digestive disorders, allergies, and low immune systems [4, 5]. The inability to function digestive enzymes in children with ASD causes gluten (a protein derived from wheat, oats, barley and their processed products) and casein (a protein derived from cow's or animal milk and their processed products) to be undigested and have an impact on behavioral disorders such as hyperactivity [5–8].

The Gluten Free Casein Free Diet (GFCF) has been shown to be able to reduce maladaptive ASD behavior, the more gluten and casein sources that are consumed, the more often hyperactive behavior appears and vice versa if the diet pattern is implemented properly the behavior shown by children is very adaptive [6, 9, 10]. This dietary regulation will indirectly reduce the intake of other nutrients in gluten and casein food sources such as vitamins and minerals, so it is necessary to pay attention to other types of food to replace the nutritional intake of ASD children and fulfill nutritional needs in an effort to support optimal child immunity.

The COVID-19 pandemic has impacted all sectors of life and all levels of society, including groups with special needs such as people with Autism Spectrum Disorder (ASD) [11, 12]. People with autism are one of the groups prone to being infected with COVID-19 [13]. The pandemic conditions have led to the closure of various public facilities such as schools and other care centers, thus providing new challenges for parents who care for children with autism. Parents, especially mothers, play an important role in regulating ASD consumption patterns [14, 15]. One of the successful evaluations of foods containing gluten and casein depends on the daily menu provided by parents. However, his condition experienced various challenges such as the level of adherence to a gluten-free and casein-free diet which was still lacking due to a lack of understanding of the concept of ASD consumption patterns, many parents introduced various types of food and allowed ASD to choose the menu they liked without paying attention to the impact on their development [11]. Therefore, this study aims to describe the mother's knowledge about a gluten and casein-free diet and its application to ASD children during the COVID-19 pandemic in Yogyakarta, Indonesia.

## 2 Materials and Methods

This type of research is a quantitative research that uses a cross-sectional study design. The research was conducted in special school and autism therapy around Yogyakarta, Indonesia. The research data was collected from February to March 2022. The research subjects were taken purposely with subject criteria, namely (1) the child had ASD, (2) the mother was willing to be interviewed, (3) the subject was willing to participate in the research. Based on the inclusion criteria, 37 people were obtained. Data was collected by filling out online questionnaires. The data processing includes editing, coding, entry,

cleaning and analysis. Analysis of research data using Microsoft Excel and the Statistical Package for Social Science (SPSS) version 16.0 for Windows.

### 3 Results and Discussion

The number of subjects in this study were 37 children with ASD. The social and economic characteristics in this study are presented in Table 1.

Most of the ASD children in this study were aged 6–12 years and most of them were boys. Generally, children with autism are more common in boys compared to girls [16]. This happened because there is a gene or a number of genes in The X chromosome linked to autism, where men only have one the X chromosome, while the female has two X chromosomes. Therefore, if the gene in one of the X chromosomes fails to perform, in girls it can be replaced by genes on other chromosomes, while in boys it does not have a backup in case of failure on the X chromosome [17].

Most of the mothers were between 31–50 years old. Most of the subjects had a family monthly income above the Yogyakarta regional minimum wage, which was more than IDR 1,840,951. Research stated that the amount of costs incurred for caring for children with autism must have a high income because of children autistic people have some disorders in the body so that it requires higher treatment costs [18].

The education level of mothers in this study mostly had higher education, namely college graduates. Research stated that generally the higher a person's education level, the better his knowledge level will be. However, parents as a respondent with a level the last high school education is enough to receive information, good from health workers and educators. So, whether the mother is good or not in parenting children are not seen from the height factor education but most importantly quality of care provided [19].

Most mothers do not work or as housewives. This research reported that parenting people with autism generally have an impact on the work of parents, especially mothers, so the mother prefers not to work and focus on raising children. Role mothers in implementing a gluten and casein-free diet are very required for close supervision on the child's diet because in adopting a gluten and casein free diet is a must correctly and regularly [20].

Mother's knowledge plays an important role in determining the quality of children's nutritional intake, including a gluten and casein free diet. The results of the study on mother's knowledge about gluten and casein-free diets in ASD children are presented in Table 2. This study showed that most mothers had good knowledge of gluten and casein-free diet (86.49%). The results showed that there is a relationship between the mother's socio-demographics background and the quality of child feeding. The level of nutritional adequacy of children is lower in mothers who have low education, including lack of knowledge of nutrition and parenting patterns [15, 18, 21].

Some mothers have also received information about a gluten-free and casein free diet (83.78%). Sources of information on gluten and casein-free diets mostly come from the internet and health professionals. This is because knowledge can be influenced by several factors such as age, education, information technology, socio-culture, economic level, environment and experience. Mother's knowledge greatly influences the application of a gluten and casein-free diet in ASD children [19].

**Table 1.** Socio-demographic characteristics of the subject (*n* = 37).

Demographic characters	Frequency	Percentage
Child's age		
1–5 years	6	16.2
6–12 years	20	54.1
13–18 years	8	21.6
19–29 years	3	8.1
Child's gender		
Female	10	23.1
Male	27	72.9
Mother's age		
20–30 years	5	13.5
31–50 years	30	81.1
> 50 years	2	5.4
Family monthly income		
<IDR 1,840,951	2	5.4
>IDR 1,840,951	35	94.6
Mother's education level		
Primary School	1	2.7
Secondary School	2	5.4
Senior High School	4	10.8
Graduated level	30	81.1
Occupation status of mother		
Not working/housewife	22	59.5
Entrepreneur	3	8.1
Government employed	3	8.1
Farmer	1	2.7
Others	8	21.6

The results of the application of a gluten and casein-free diet during the COVID-19 pandemic showed that most ASD children still consumed foods containing gluten (86.49%) and casein (67.57%) during the COVID-19 pandemic. Some food sources of gluten that are still frequently consumed are noodles, bread, pastries, biscuits, and fried chicken. Some food sources of casein that are still frequently consumed are cow's milk and ice cream. This shows that the level of knowledge of mothers is not comparable in implementing a gluten and casein-free diet during the COVID-19 pandemic. There are several factors that influence parental compliance in implementing a gluten and casein-free diet such as demographic factors, knowledge, therapeutic communication, attitudes, and family support [22].

**Table 2.** Distribution Mother’s level of knowledge and access to information on gluten and casein free diet

Variable	Frequency	Percentage
Mother’s Knowledge		
Good	32	86.5
Enough	5	13.5
Ever get information		
Ever	31	83.8
Never	6	16.2

## 4 Conclusion

Most of the mothers with ASD children in this study had good nutrition knowledge and a gluten and casein-free diet (86.49%). Some mothers have also received information about gluten and casein-free diets (83.78%) and most of the sources of information came from the internet. Most of the ASD children in this study still consumed foods containing gluten (86.49%) and casein (67.57%) during the COVID-19 pandemic.

## 5 Conflicts of Interest

The authors declare they have no conflicts of interest.

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