Prevalence of Malocclusion and Orthodontic Treatment Need in Children with Autism

Elih Sayuti[1]*, Deni Sumatri Latif[1], Melinda Aziz[1], Inne Suherna Sasmita[2]

1. Department of Orthodontics, Faculty of Dentistry Universitas Padjadjaran, Indonesia.
2. Department of Pediatric Dentistry, Faculty of Dentistry Universitas Padjadjaran, Indonesia.

Abstract

Children with autism disorder are considered to have a higher risk of malocclusion than normal children due to cariogenic dietary habits, bad oral health habits, and barriers to dental care. The purpose of this study was to determine the prevalence of malocclusion and orthodontic treatment need in children with autism disorders at Bandung City.

A descriptive survey of 20 children with autism consisted of 16 boys and 4 girls. The research subjects were children with autism at the Prananda autism school, Bandung, Indonesia. Malocclusion was determined based on Angle's classification, and the orthodontic treatment need level was determined by the Dental Health Component (DHC) in the Index of Orthodontic Treatment Need (IOTN).

The results showed that the most malocclusion found in children with autism was Angle Class I malocclusion (65%), Class II malocclusion was 30%, and Class III malocclusion was 15%. Based on the IOTN, the treatment need level in children with autism spectrum disorder (ASD) was little need with a percentage of 35%.

The highest prevalence of malocclusion of children with ASD in this study was Angle Class I malocclusion and the orthodontic treatment need level was little need for treatment.

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Introduction

According to the Autism Society of America (ASA), autism spectrum disorder (ASD) is a neurodevelopmental disability with symptoms in the first three years of life whose aetiology comes from brain neurological disorders and impacts on social development and communication skills .[1] ASD is global health problems, come from any circle, are not influenced by ethnicity or social status, and currently, the cases tend to increase. [1-3]

Children with ASD have unique characteristics in their behaviour, including not responding calls and shows no eye contact, shows no interest in likeable objects, inability to interact with others, inability to play imaginative games, easily distracted, experiences speech and language delays and tends to repeat words or sentences, echolalia (imitates), obsessive interests, likes to flapping hands, stomps or turn suddenly, exhibits self-torture (self- mutilation), mutism (silence), reversal of sentences and words, repetitive and stereotypical play activities, vital memory routes, an obsessive desire to maintain the order of their environment, fear of change, preferring images and inanimate objects. 50% of ASD individuals have intellectual disability problems of varying severity degrees. [1,3]

According to the Autism Foundation in Indonesia and Indonesian health ministry, the number of children with ASD increases annually, but there is no definite survey regarding the precise number. It is estimated that in 2004, there were approximately 475,000 individuals with ASD. It can be seen from the number of patient came to health provider such as general hospital or even the psychiatric hospital that increase every year. [4,5]

ASD individuals have no specific oral features. Oral status and manifestations of ASD depend on the individual's age and developmental stage. Individuals with ASD have

*Corresponding author:
Dr. Elih Sayuti,
Department of Orthodontics,
Indonesia Department of Pediatric Dentistry, Faculty of Dentistry Universitas Padjadjaran, Indonesia
E-mail: elihortho@yahoo.co.id

a high caries risk. Oral conditions caused by medications for ASD can cause xerostomia. The majority of children with ASD prefer sweet and sticky foods, thus leads to poor oral hygiene.[3,6]

Malocclusion is the third most prevalent oral disease and is considered a public problem because of its high prevalence rate. According to different studies teenagers who sought orthodontic treatment, especially those with more serious malocclusion, have shown a lower quality of life regarding to oral health than those who did not seek orthodontic treatment.[7]

The severity of malocclusion can determine the need for orthodontic treatment .[7] The orthodontic treatment need index can identify the patient's need for orthodontic treatment and also determine the priority of orthodontic treatment. One of the indexes often used is the index of orthodontic treatment need (IOTN) which consists of aesthetic component (AC) as a subjective component and dental health component (DHC) as an objective component. The two components are assessed separately .[8]

There are still few studies have reported the prevalence of malocclusion and orthodontic treatment need of children with ASD in Indonesia. The purpose of this study was to determine the prevalence of malocclusion and orthodontic treatment need in children with autism disorders at Bandung City.

Materials and methods

This research was a descriptive survey. The number of subjects was 20 children with ASD obtained by total sampling method from the Prananda Autism Special School in Bandung, Indonesia. All study subjects had filled informed consent which signed by their parents or teachers. The study has been approved by the research ethics committee of Universitas Padjadjaran with the approval number of 27/UN6.KEP/EC/2019.

The inclusion criteria were having at least one permanent first molar connection or permanent canine, and the child was not undergoing orthodontic treatment. Malocclusion data was collected based on the Angle's classification, while the level of orthodontic treatment need was obtained through a clinical examination using the Dental Health Component (DHC) in the Index of Orthodontic Treatment Need (IOTN) (Table 1).[9]

Grade 1 - No need for treatment
Extremely minor malocclusions, including displacements less than 1 mm
Grade 2 – Little need for treatment
a. Increased overjet > 3.5 mm ≤ 6 mm with competent lips .
b. Reverse overjet > 0 mm but ≤ 1 mm.
c. Anterior or posterior crossbite with ≤ 1 mm discrepancy between retruded contact position and intercuspal position.
d. Contact point displacement of teeth >1 mm but ≤2 mm.
e. Anterior or posterior open bite > 1 mm but ≤ 2 mm.
f. Increased overbite ≥ 3.5 mm without gingival contact.
g. Pre-normal or post-normal occlusions with no other anomalies. Includes up to half a unit discrepancy.
Grade 3 - Borderline need for treatment
a. Increased overjet >3.5 mm but ≤ 6 mm with incompetent lips.
b. Reverse overjet greater than 1mm but ≤ 3.5 mm.
c. Anterior or posterior crossbites with >1 mm but ≤ 2 mm discrepancy between retruded contact position and intercuspal position.
d. Contact point displacement of teeth > 2 mm but ≤ 4 mm.
e. Lateral or anterior open bite greater than 2 mm but ≤ 4 mm.
f. Increased and complete overbite without gingival or palatal trauma.
Grade 4 – Great need for treatment
a. Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis.
b. Increased overjet > 6 mm but ≤ 9 mm.
c. Reverse overjet > 3.5 mm with no masticatory or speech difficulties.
d. Reverse overjet greater than 1 mm but ≤ 3.5 mm with recorded masticatory and speech difficulties.
e. Anterior or posterior crossbites with > 2mm discrepancy between retruded contact position and intercuspal position.
f. Posterior lingual crossbite (scissors bite) with no functional occlusal contact in one or both buccal segments.
g. Severe contact point displacements of teeth > 4 mm.
h. Extreme lateral or anterior open bites > 4mm.
i. Increased and complete overbite with gingival or palatal trauma.
j. Partially erupted teeth, tipped and impacted against adjacent teeth.
k. Presence of supernumerary (e.g. Supplemental teeth).
Grade 5 – Very great need for treatment
a. Impeded eruption of teeth (with the exception of third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause.
b. Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics.
c. Increased overjet > 9 mm.
d. Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties.
e. Defect of cleft lip and palate/craniofacial anomalies.
f. Submerged deciduous teeth.

Table 1. Dental Health Components (DHC) Of The IOTN [9]

Results

This study included 20 subjects consisted of 16 male and 4 female children (Table 2). The highest percentage of malocclusion found was Angle class I malocclusion (13 children (65%)), class II malocclusion was found in 6 children (30%), and class III malocclusion was found in 3 children (15%) (Table 3).

As many as 5% of the research subjects showed the grade 5 level of treatment need. As many as 35% of respondents indicated the grade 2 level of treatment need. Most respondents showed little and no need for orthodontic treatment (Table 4).

Characteristics	n (20)	%
Sex		
Male	16	80
Female	4	20
Age (years old)		
5-10	6	30
11-15	10	50
16-20	4	20

Table 2. Characteristics of the Subjects.

Angle's Classification	Number (n)	Percentage (%)
Class I malocclusion	13	65
Class II malocclusion	6	30
Class III malocclusion	3	15

Table 3. Percentage of Malocclusion Based on Angle's Classification in Children with Autism

DHC - IOTN	n (%)
1 No need for treatment	5 (25)
2 Little need for treatment	7 (35)
3 Borderline need for treatment	4 (20)
4 Great need for treatment	3 (15)
5 Very great need for treatment	1 (5)

Table 4. The Level of Treatment Need Based on the Dhc - Iotn

Discussion

Autism is a pervasive developmental disorder characterised by the inability to have social interaction, communication, the presence of behavioural patterns and interests or repetitive activities and stereotypes .[10] These conditions can interfere with growth and development. The leading cause of ASD is still unknown, but it is thought to be multifactorial, which is influenced by genetic factors, environmental factors, and neurological development factors .[11-13]

The percentage of children with autism disorders based on sex in this study was consisted of 80% male and 20% female children, as shown in Table 1. This result was following the prevalence of autism, according to the CDC (Centers for Disease Control and Prevention) data in 2014, which showed an increase of 16.8 out of 1,000 children experiencing ASD with a male to female ratio of 4:1 and the disorder is more prevalent among non-Hispanic people compare to Hispanic people.[14,15] Similar to the research conducted by Milyawati et al., which stated that 80.6% of children with ASD were male and the rest 19.4% are female children .[15] Dumas et al. also stated that male children have four to five times higher chance of ASD than female children .[16]

Behavioural disorders in children with autism disorders are influenced by various factors, one of which is food. Food consumption patterns are one of the factors that must be considered for children with autistic spectrum disorder (ASD) because certain foods are prohibited, which are foods that contained gluten and casein .[17] An individual with ASD, in general, has unusual pores in the gastrointestinal membrane and intestinal mucosa hyperpermeability. Gluten and casein in children with autistic disorders, only broken down to polypeptides. The intestinal mucosa hyperpermeability causes a peptide increase. The polypeptides of these two proteins are not digested out of the intestinal wall but will be absorbed into the bloodstream and circulate in the form of gluteomorphins and caseomorphins, then bind to the brain opioid receptors. These receptors are associated with mood and behaviour, which will raise the behavioural disorder's symptoms in autistic children .[17] Sensory sensitivity in children with ASD is also associated with uncooperative behaviour in the dental clinic.

According to the American Psychiatric Association (APA), children with autism have deficiencies in social and emotional communication skills. For example, abnormal social approaches, failure to carry out two-way communication, and failure to take the initiative or respond to social interactions, which significantly affects the lack of cooperation in maintaining oral health. They are generally unable to cooperate during dental treatment because autistic children usually do not tolerate

exposure to foreign sounds, lights, smells, and colours, which makes it challenging to achieve good oral health care .[18,19]

Previous studies have shown that approximately 50-72% of children with ASD exhibit non-cooperative behaviour during dental treatment. Aggressive and uncooperative behaviour during dental treatment has the potential to hinder, change, or reduce access to treatment for children with ASD.[10,14,20]

This present study showed that most of the children with autism have malocclusion, with the most malocclusion classification found was class I (65%), followed by class II (30%) and class III (15%). This result was consistent with the results of previous studies which suggested that in children with ASD, class I malocclusion was found more than class II and class III malocclusion .[21]

An individual with autism usually have poor oral hygiene; this often causes caries, untreated caries, and resulting in the premature loss of primary teeth, which can lead to the malocclusion risk .[22] An individual with autism usually consume soft foods; besides, the weak muscles cause laziness in the mastication, which will affect the growth and development of the jaw thus becoming a factor in the occurrence of malocclusion. Also, malocclusion often associated with bad habits such as mouth breathing, thumb sucking, tongue thrusting, nail-biting, and bruxism .[19]

Bad habits carried out by children with autism can decrease the oral health status and cause several malocclusion abnormalities both dental and skeletal, such as protrusive anterior teeth, posterior crossbite, anterior crossbite and open bite.[22-24]

Malocclusion often causes oral health, mastication, speech, and aesthetics problem, thus affecting the quality of life. Malocclusion does not disable the oral function but can cause difficulties.[8,25] An individual's quality of life can be affected by the severity of the malocclusion. The more severe the malocclusion conditions, the worse the quality of life they have.[26]

The severity of malocclusion can determine the need for orthodontic treatment .[27] The orthodontic treatment need index can identify the patient's need and priority for orthodontic treatment. The level of orthodontic treatment need is obtained through a clinical examination using the Dental Health Component (DHC) in the Index of Orthodontic Treatment Need (IOTN).[9,28]

The present study proved that the highest orthodontic treatment need for children with autism was the little need for treatment, which was found in as much as 35% of children. This result also showed that very great need for orthodontic treatment was only found in 5% of children, and normal/mild malocclusion, which does not require treatment was found in 25% of children (Table 4). On the contrary, the study conducted by Luppanapornlarp et al. proved that more than 50% of children with autism had malocclusions that required orthodontic treatment. [22]

Due to behavioural problems and the increasing prevalence of autism worldwide, a review of oral conditions in specific malocclusion and the level of orthodontic treatment need in children with autism disorders will help the general dental practitioners or orthodontist to plan and provide appropriate and effective malocclusion prevention and treatment procedures to improve the quality of life of children with autism.

Conclusions

Based on this research, the highest prevalence of malocclusion of children with ASD in this study was Angle Class I malocclusion and the orthodontic treatment need level was little need for treatment. This study suggests providing professional services that handle dental health for children with special needs including autism, and parental education so that can improve skills to care dental health and efforts to prevent bad habits in children with autism that often lead to malocclusion.

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Declaration of Interest

The authors report no conflict of interest.

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