Dental Journal
Majalah Kedokteran Gigi

Dental Journal
(Majalah Kedokteran Gigi)
2018 June; 51(2): 71–75

Research Report

Behavior management-based applied behaviour analysis within dental examination of children with autism spectrum disorder

Taufiqi Hidayatullah,[1] Hendriati Agustiani,[2] and Arlette Suzy Setiawan[3]
[1]Faculty of Dentistry, Universitas Syiah Kuala, Banda Aceh - Indonesia
[2]Faculty of Psychology, Universitas Padjadjaran, Bandung - Indonesia
[3]Department of Paediatric Dentistry, Faculty of Dentistry, Universitas Padjadjaran, Bandung - Indonesia

ABSTRACT

Background: *Autism spectrum disorder (ASD) is a developmental disorder with three main characteristics: communication disorders, social interaction disorders and repetitive behavior. The main problem faced when treating child patients with this disorder is the difficulty of establishing communication with the result that they are unable to understand instructions. One form of therapy frequently applied in cases of autism is that of applied behavior analysis (ABA). It is easier for children with ASD to absorb information visually.* ***Purpose:*** *The purpose of this study was to evaluate the effectiveness of ABA-based behavior management using visual media in the form of picture cards for oral examination of children with ASD.* ***Methods:*** *The study design was observational descriptive in nature and the sample selection was based on purposive sampling. The study was conducted by observing changes in childrens' behavior during treatment administered four times a month. The subjects were 13 children with ASD who met the study criteria and were receiving treatment for autism at Prananda special school in Bandung. The collated data related to changes in subjects' behavior observed during four meetings assessed on the basis of score 1 confirming compliance with instructions and 0 indicating non-compliance. A Kruskal-Wallis statistical analisysis test was used to analyze the data.* ***Results:*** *The results showed a general increase in the former over the latter initial behavior during treatment. Statistical analysis showed that the coefficient of Kruskal-Wallis was meaningful in terms of statistical significance with a p-value of 26.947 (<0.05). The multiple comparison value for average ranks was 15.68 (SD 18.69).* ***Conclusion:*** *The conclusion of this study is that the application of a behavior management-based analytical methodology is effective in supporting the oral examination of children with ASD.*

Keywords: *autism spectrum disorder, applied behavior analysis, behavior management*

Correspondence: Arlette Suzy Setiawan, Department of Paediatric Dentistry, Faculty of Dentistry, Universitas Padjadjaran, Jl. Raya Bandung Sumedang KM. 21, Jatinangor 45363, Indonesia. E-mail: arlettesuzy@yahoo.com

INTRODUCTION

Autism is defined as a developmental disorder featuring the three main characteristics of impaired communication, social interaction disorder and repetitive behavior. Studies on autism reveal it to be a disorder with a broad spectrum of symptoms. Autistic children possess unique and diverse characteristics and exhibit individual symptoms with varying degrees of severity in terms of both quality and quantity. Autism is now often referred to as ASD.[1,2]

Autistic spectrum disorder is one of the fastest growing forms of developmental disability. The number of cases continues to increase every year. In 2012, the Data Center for Disease Control and Prevention (CDC) has reported the increasing incidence of autism. The average prevalence of individuals identified with ASD in Asia, Europe and North America is between 1% and 2%.[3,4]

A 2013 literature review by Putri highlighted that there are approximately 6900 children suffering from ASD in Indonesia with the number expected to increase annually. Putri also cited several researchers who conclude the number of ASD people in the country to have increased over the last 20 to 30 years. Nevertheless, in Indonesia there has been no further detailed study, with the result that the number of people with ASD cannot be definitively ascertained.[4]

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 32a/E/KPT/2017.
 Available at http://e-journal.unair.ac.id/index.php/MKG
DOI: 10.20473/j.djmkg.v51.i2.p71–75

A key area of challenge when dealing with sufferers of ASD is to identify a means of communicating effectively in order that information can be successfully conveyed. Communication problems with individuals affected by ASD are often accompanied by restricted intellectual capacity, uncontrolled body movements, hyperactivity, limited attention span and a propensity to become easily frustrated or angry and to self-harm when something takes them out of their comfort zone.[5,6]

Children with ASD need treatment for their overall well-being as well as their oral and dental health. Caries and inadequate oral hygiene represent common problems. A sufferer of ASD, like any child, should enjoy access to dental care. Communication barriers constitute a major problem to be resolved by dentists. A child afflicted by ASD is generally difficult and unable to understand direct instructions or accept strangers present in the vicinity. Modified communication is necessary if such children are to prove cooperative.

Children with ASD experience significant difficulties in comprehending oral information effectively. Their understanding of the environment is based more on body language cues or alternative forms of non-verbal communication. Many studies contained in the literature on the subject reveal that children with ASD process visual information more effectively. At present, numerous educational strategies have been developed for children with ASD through the use of visual media as a means of interaction.[1,3,7,8]

One common method of the educational processes or therapies employed with children suffering from ASD is applied behavior analysis (ABA). ABA is a branch of psychology whose application focuses on the analysis and modification of human behavior.[6] ABA-based procedures have been accepted by the American Academy of Paediatrics Dentistry (AAPD) as a form of behavioral management of children with limited communication. Such procedures have the potential to improve the results of conventional behavior management practices. The approach is expected to support ASD children in behaving more appropriately so that they can receive enhanced dental and oral care treatment. Dentists can minimize the need for interventional behavioral management such as restraint, sedation and care delivered under general anesthesia.[7]

The application of ABA can employ various tools. For example, visual media is suitable for promoting the learning of children with ASD. One simple form of visual media is a picture card created as required which can help dentists to communicate with children suffering from ASD. Appropriate methods will support the successful use of these media, while moulding the child's behavior to better receive dental and oral care procedures.[5–7]

The purpose of this study was to analyze the effectiveness of ABA-based management methods using image cards within behavior-based management of children with ASD during dental and oral examinations.

MATERIALS AND METHODS

The research population of this study comprised children diagnosed with autism spectrum disorder who attended Sekolah Prananda, a special school in Bandung. Diagnoses of the condition were based on DSM V and ranged in severity from mild to moderate (level 1 and level 2) encompassing individuals who still require assistance with certain activities, but who have started to follow instructions and do not display extreme behaviour such as uncontrolled tantrums. The study was conducted between early July 2015 and the end of August 2015. In this research, determining the sample was performed by a combination of non-probability sampling and purposive sampling.

The design of this study constituted an observational descriptive case study type, being an intensive review of an individual/group of individuals deemed to fall within a particular case. The research employed a single subject approach design. Such methodology is used to conduct in-depth exploration of specific events, the focus being on a small number of events investigated in depth with a set time span. In addition, it also focuses on individual data as samples.[9] Single subject research is used to highlight or change the behavior of individuals with an important issue as the result of an intervention.[10,11]

Treatment was conducted four times at one-week intervals for a month. Subjects were treated using an ABA-based method with the aid of picture cards and assessed after each treatment session. Parents and teachers were asked to fill in a questionnaire about the child's daily behavior prior to treatment, including: the parent and child profile, the child's medical/systemic condition, the child's ability to execute daily activities (e.g. going to the toilet, using cutlery and brushing his/her teeth), the child's reaction to being given assistance such as having his/her hair and nails cut and questions about his/her general everyday behavior. Questions to the teacher covered the child's ASD level, severity of intellectual disability, daily behavior at school, conditions potentially triggering aggressive behavior, conditions conducive to maintaining concentration during therapy, objects or conditions that make him/her content and suitable learning media for the child to internalise information or follow instructions. The teacher was also asked about characteristics of the child's behavior such as the ability to maintain eye contact, self-mutilation tendencies, PICA and the frequency of tantrums. A day prior to treatment, the teacher prepared the child by showing a picture card related to the following day's treatment. Four people were present in the treatment room, namely: operators, assistant operators, teachers and children. Before each treatment session, the teacher and the operator showed the child image cards depicting its successive steps. Every time the child succeeded in following instructions, a verbal praise was given in the form of his/her favorite complements interspersed with personalized rewards identified from the feedback provided through the parents

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 32a/E/KPT/2017.

DOI: 10.20473/j.djmkg.v51.i2.p71–75

and teacher questionnaires. If a child refused to follow instructions the reward was withheld. The instructions were repeated until the child proved successful in executing the task. Failure to follow instructions resulted in his/her not proceeding to the next stage. The duration of treatment was limited to 15 minutes per meeting. If the child's attention was suddenly distracted during treatment, his/her focus was restored by removing the cause of the distraction, repeating instructions and giving direction as required. During a particular session, successfully completed stages were repeated before the child proceeded to the next stage. Observation was conducted of those stages determined by the indicator. In each session, activities which according to the indicators were considered appropriate to the child's developmental stage were graded as follows: increase in level of engagement = 1; no change or the child is unwilling to enter the room = 0.

The stages of instruction amounted to 10 sequential criteria. All stages were worth 1 except the first which was rated at 0. The various stages were as follows; first, the child did not want to enter the room/was not yet calm (0); second, the child was calm but distracted when in the room (1); third, the child was able to sit calmly in the room (1); fourth, the child was willing to shake hands with operator and assistant (1); fifth, the child sat in a chair and opened his/her mouth (1); sixth, the child sat in a chair, opened his mouth and was willing to be examined with a dental mirror (1); seventh, the child sat in a chair, opened his mouth and was willing to be examined with an explorer (1); eighth, the child was willing to have his/her teeth smeared with disclosing agent (1); ninth, the child accepted the cleaning of his/her teeth using cotton/cotton roll (10; and tenth, the child was able to brush his/her teeth and gargle (1). The lowest value for each treatment was 0 and the highest was 9. Any increase, decrease or lack of persistence of behavioral stages was observed during the intervals between each treatment session.

RESULTS

The research population consisted of children being treated for ASD at Prananda special school in Bandung. Based on the number of available samples, research subjects were selected, according to the following predefined criteria: subjects were still actively receiving therapy at Prananda special school for autism in Bandung, subjects had never undergone a routine dental check up, and subjects suffered from category 1 and 2 (mild and moderate) autism spectrum disorder as defined by the DSM V diagnostic criteria. The number of children receiving therapy at the school was 27. Nine were absent due to temporary leave, while five did not meet the inclusion and exclusion criteria. Consequently, the study sample consisted of 13 children divided into 11 boys and two girls ranging in age from 5 to 18 and with a median of 2-3 years. Generally, they received autistic therapy shortly after a diagnosis of ASD.

Table 1 contains the score/value of the children recorded at each meeting. The results suggest that there was an increased value in their behavior. Two children were able to complete all stages of behavior before the final stage of treatment. At that stage, the child was prepared to sit in a chair, open his/her mouth and be examined with an oral mirror. In general, the stage of behavior that can be completed by children in this study is the willingness to open their mouths without the use of tools.

Table 1. Scores relating to respondents' behavior stages during four consultations

No. Respondent	First Consultation	Second Consultation	Third Consultation	Fourth Consultation
1	1	3	3	5
2	1	3	4	5
3	4	5	6	8
4	1	3	4	4
5	1	3	3	4
6	1	3	3	3
7	1	3	6	9
8	3	5	5	6
9	3	4	4	5
10	4	5	9	9
11	1	3	4	5
12	3	3	4	5
13	1	3	4	5

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 32a/E/KPT/2017.

DOI: 10.20473/j.djmkg.v51.i2.p71–75

Table 2. Kruskal-Wallis test analysis for establishing the effectiveness of ABA-based behavior management using a picture card in comparison to dental and mouth examination of children with ASD

Median	n	Avg. Rank	
1.00	13	11.19	W1
3.00	13	23.08	W2
4.00	13	31.92	W3
5.00	13	39.81	W4
4.00	52		Total
		26.947	H (corrected for ties)
		3	d.f.
		6.04E-06	

During the first meeting, all the children succeeded in entering the room. Eight children recorded an unreliable response because their attention was distracted. Three children were able to sit quietly in the room, shake hands with the operators and assistants, while the other two, in addition to being able to sit quietly and shake hands also proved capable of sitting in a dental chair and calmly open their mouths without the use of a tool.

During the second meeting, nine children were able to sit quietly in the room and shake hands with the operators and assistants. One child was able to sit quietly and was willing to open his/her mouth without tools, while another three children voluntarily opened their mouths to enable examination with tools. The result of the second meeting was an improvement in behavior in 12 children with only one child not improving or demonstrating worsening behavior.

The third meeting confirmed six children as being capable of following the instruction to open their mouths without tools. One child opened his/her mouth and was examined with an oral mirror, while another two children opened their mouths and were checked using an explorer. One child proved able to complete this behavioral stage, but three children merely wanted to shake hands with the operators and assistants. The result of the third meeting was an improvement in behavior in eight children, five other children proved to be at the same stage of behavior as during the second meeting.

The fourth meeting revealed that two children were able to complete all stages including one who was able to undergo all stages during the third meeting. One child was already willing to accept a disclosing agent and clean his teeth with cotton, although not to brush them. Two children wanted to merely sit with their mouths open. One child would open his/her mouth and was examined using the explorer, while another simply wanted to play with it. Six children proved able to complete the five stages of opening their mouths and being examined with an oral mirror. The conclusion of the last meeting was an improvement in behavioral stages in 11 children including one who was able to complete all stages during the third meeting. However, there were two children who still demonstrated no improvement in the behavioral stages.

Statistical analysis in the form of a Kruskal-Wallis test (Table 2) was used to test the effectiveness of ABA-based behavioral management using picture cards of dental and oral examination of ASD children. A Kruskal-Wallis test is a rank-based nonparametric test whose purpose is to determine whether there are statistically significant differences between two or more independent variable groups on numerical and ordinal scaled dependent variables.

A statistical test conformed a statistically significant Kruskal-Wallis coefficient with Chi-square value = 26.947 and p-value (6.04E-06) <0.01. The conclusion reached was that the application of the ABA method using effective or statistically significant static cards proved successful in managing behavior during oral and dental examination in children with ASD.

DISCUSSION

The main focus of this study was to apply ABA methods that are often utilised during behavioral therapy of children with ASD and to combine them with visual media in the form of picture cards. The study aimed to establish the effectiveness of the method applied in relation to the child's cooperative level during oral and dental examinations. The results showed its effectiveness in boosting the child's level of cooperation as evident from the increase in behavioral stages that can be completed by his/her following instructions at each consultation.

The application of an ABA-based method in this study used visual media in the form of picture cards to enhance the effectiveness of ASD child behavior during dental and oral examination. According to the literature on the subject, visual media represent one of the most suitable forms of media for the treatment of children with ASD who respond positively when shown picture cards. The cards shown to the child each time with instructions are useful when he/she becomes distracted or anxious. At times during a study, researchers also demonstrated how to receive such treatment. For example, when instructing a subject to open his/her mouth, the researchers gave an example of how to do so. Choirunissa emphasized that

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 32a/E/KPT/2017.

DOI: 10.20473/j.djmkg.v51.i2.p71–75

body language is also a form of visual support.[3] Children who have begun to communicate verbally are generally not so affected by the cards because they already understand instructions. A child will better understand when given a direct example of body language and the use of tools is explained directly. Nevertheless, the average ASD child is incapable of effective verbal communication. During the study, the behavior of children at all levels can vary with each meeting, being cooperative on one occasion yet uncooperative on others.

The conclusions of this study show that visual media support in the form of an effective picture card supports the application of ABA principles when performing dental and mouth examination of child with ASD. This is because generally such individuals readily receive visual instruction. It is suggested that further research of longer duration needs to be undertaken involving a larger number of research subjects with more diverse characteristics. In addition, the type of visual media in electronic media can be tested on children with ASD, given that technology has developed sufficiently rapidly that dentists can apply it in one form of media.

REFERENCES

1. Riandini S. Pengaruh pola pengasuhan dengan perkembangan komunikasi anak autis kepada orang tua. Med J Lampung Univ. 2015; 4(8): 99–106.
2. Udhya J, Varadharaja MM, Parthiban J, Srinivasan I. Autism disorder (AD): an updated review for paediatric dentists. J Clin Diagn Res. 2014; 8(2): 275–9.
3. Nirahma CP, Yuniar IC. Metode dukungan visual pada pembelajaran anak dengan autisme. J Psikol Klin dan Kesehat Ment. 2012; 1(2): 1–8.
4. Putri SPNMDAA, Astrini A. Persepsi orang tua tentang pola attachment anak dengan autism disorders di klinik "X" Jakarta Barat. Thesis. Jakarta: Binus University; 2013. p. 1-11.
5. Dewi R. Peran orangtua terhadap terapi biomedis untuk anak autis. Thesis. Depok: Gunadarma University; 2009. p. 1-20.
6. Astutik IP. Penerapan Metode ABA (Applied Behaviour Analysis) dengan media kartu bergambar dan benda tiruan secara simultan untuk meningkatkan pengenalan angka pada siswa kelas II di SDLB autis harmony Surakarta tahun pelajaran 2009/2010. Thesis. Surakarta: Universitas Sebelas Maret; 2010. p. 1-56.
7. Hernandez P, Ikkanda Z. Applied behavior analysis: behavior management of children with autism spectrum disorders in dental environments. J Am Dent Assoc. 2011; 142(3): 281–7.
8. Morisaki I, Ochiai TT, Akiyama S, Murakami J, Friedman CS. Behaviour guidance in dentistry for patients with autism spectrum disorder using a structured visual guide. J Disabil Oral Heal. 2008; 9(3): 136–40.
9. Delli K, Reichart PA, Bornstein MM, Livas C. Management of children with autism spectrum disorder in the dental setting: concerns, behavioural approaches and recommendations. Med Oral Patol Oral Cir Bucal. 2013; 18(6): e862–8.
10. Marienzi R. Meningkatkan kemampuan mengenal konsep angka melalui metode multisensori bagi anak autis. J Ilm Pendidik Khusus. 2012; 1(3): 320–31.
11. Margaretha SEPM. Efektifitas video self modelling terhadap kemampuan menggosok gigi pada anak dengan autisme spectrum disorders di karesidenan Banyumas. Thesis. Depok: Universitas Indonesia; 2012. p. 1-100.

Dental Journal (Majalah Kedokteran Gigi) p-ISSN: 1978-3728; e-ISSN: 2442-9740. Accredited No. 32a/E/KPT/2017.

DOI: 10.20473/j.djmkg.v51.i2.p71–75