

## Comparison of the Effectiveness of Two Intervention Methods in Reducing Stress Levels in Children with Autism

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### Abstract

This study was conducted to compare the effectiveness of video modeling with that of the visual pedagogical module in reducing stress levels during dental treatment in children with autism spectrum disorders (ASD). This clinical experimental study comprised 20 children (age, 6–10 years) with ASD who had been diagnosed with ASD by a pediatrician or psychiatrist. The subjects were divided into two groups: video modeling and the PV-BDG module intervention groups (n = 10 each). Saliva was collected from the subjects before and after the interventions to measure the salivary immunoglobulin A (sIgA) levels. Data analysis was performed using the Shapiro–Wilk normality test and independent t-test to compare differences in stress reduction between the two groups. A decrease in sIgA levels was observed after the PV-BDG module intervention. The average levels of sIgA after the video modeling and visual pedagogical module interventions were  $-15.06 \pm 23.85$  and  $34.46 \pm 9.83$ . However, no significant difference in  $\Delta$ sIgA levels was noted between the two groups. Video modeling and visual pedagogical modules can effectively reduce the stress levels of children with ASD during dental care as measured by changes in the sIgA levels.

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### Introduction

The prevalence of autism, a neurodevelopmental disorder, is expected to increase in the future.<sup>1</sup> Currently, the worldwide prevalence of autism spectrum disorders (ASD) is estimated at 2–4 per 10,000 children and is thought to increase to 50–60 per 10,000 children. A survey in the United States put the prevalence of ASD at 16.8 per 1,000 children aged 8 years (range, 13.1–29.3 per 1,000 children). Boys are four times more likely to have ASD than girls, and the disorder is more prevalent among non-Hispanic people compared to Hispanic people.<sup>2</sup> There is no statistical data on the prevalence of ASD in Indonesia; nonetheless, the number of autism-related visits to hospitals or clinics is on the increase each year.<sup>1</sup>

The diagnostic criteria for ASD have been updated and rearranged based on the 5<sup>th</sup> edition of the Diagnostic and Statistical Manual of Mental Disorders as follows: 1) social communication and interaction, and 2) restrictive and repetitive patterns of behavior, interests, and activities. The presence of sensory disturbance is one of the subset criteria for ASD diagnosis. These symptoms begin to appear during early development but are sometimes not seen until social demands exceed the child's capacity.<sup>3</sup>

Communication is a challenge for children in the autism spectrum, and most of them require dental and oral health care. The oral hygiene of children with ASD is not optimal; caries, periodontal abnormalities, wounds in areas such as the tongue, mucosa, and gingiva, as well as attrition are often found to be related to anxiety levels. Communication barriers are a major problem that must be resolved by dentists. Children on the spectrum tend to have difficulty communicating, understanding instructions and information given directly, and accepting strangers. They get anxious easily and sometimes act aggressively when entering a new environment.<sup>4</sup>

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The level of stress in children with ASD can be ascertained through questionnaires and the measurement of biomarker levels in saliva. Stress can affect the salivary levels of immunoglobulin (Ig) A. This has been the focus of attention in some psycho-immunological studies due to its sensitivity to variations in subjective and objective stress levels; IgA is considered as one of the stress biomarkers.<sup>5,6</sup>

Studies using interventions, such as visual pedagogy, picture books, and modeling in video or audio-visual forms, aimed at reducing the level of anxiety in children with ASD have been conducted. Video modeling is an effective method of learning for children in the autism spectrum.<sup>7</sup> In Indonesia, research has been carried out on the development of visual pedagogy modules for children with ASD in order to reduce anxiety.<sup>8</sup>

The aim of this study was to compare the effectiveness of video modeling with that of the visual pedagogical module in reducing stress levels during dental treatment in children with ASD.

### Materials and methods

This clinical experimental study on the use of video modeling and the visual pedagogy module was conducted in 20 children (age, 6–10 years) with ASD. The children were officially diagnosed by pediatricians or psychiatrists, had never visited a dentist, could follow simple instructions, had no comorbid abnormalities, and were in good health. The research subjects were divided into two intervention groups: video modeling group and visual pedagogical module group (n = 10 each). Before the video intervention, a video validity test was performed on three autistic children. The video was valid if a decrease in the level of anxiety during the dental examination was observed. This was evaluated by measuring the level of saliva IgA (slgA).

The study was conducted at Dental Hospital, Faculty of Dentistry, Universitas Indonesia. Ethical clearance was obtained from the Ethical Committee at the Faculty of Dentistry. Informed consent was obtained from the parent or guardian of the subject along with an explanation of the research procedure before starting the study. The research procedure began by collecting the saliva from the base of the child's tongue to measure the slgA level before

the intervention. The cotton placed at the base was squeezed and the saliva was collected in a sample separator tube (SST). Subsequently, the study participants were provided with an intervention using the video modeling or the PV-BDG module followed by oral prophylaxis. The saliva was collected after the intervention and stored in the SST at -20°C. The slgA levels were measured using an enzyme-linked immunosorbent assay kit (Salimetric, USA)

Significant differences in saliva slgA levels between the two intervention methods were observed using the unpaired t-test. The significance value was set at  $p \leq .05$ .

### Results

A normality test was performed to evaluate the data collected from the two groups of subjects. As seen in Table 1, the mean values, standard deviations (SD) in the video modeling intervention group before and after the intervention were  $34.77 \pm 27.37$  and  $49.84 \pm 51.22$ , respectively.

Variable	n	slgA levels		□	P value
		Mean	SD		
		Before	After		
Video modeling	10	34.77 □ 27.37	49.84 □ 51.22	-15.06 □ -23.85	.04
Module PV-BDG	10	48.644 □ 35.25	14.18 □ 9.833	34.46 □ 9.83	.154

**Table 1.** slgA levels between the two intervention groups.

The average levels of slgA were increased after intervention with video modeling ( $p < .05$ ), whereas in the PV-BDG module group, a decrease in slgA levels was noted after the intervention. The negative value in the Table indicates an increase in the level of anxiety after the video modeling intervention. No significant difference in the  $\Delta$ slgA levels was observed between the two intervention groups (Table 2).

Intervention	Mean (SD)	Nilai p
Video modeling	-15.06480	.065
Module PV-BDG	34.46870	

**Table 2.** Independent t-test analysis. SD, standard deviation.

## Discussion

Stress is a psychological condition that can cause mental or physiological pain in an individual. Mild stress can reduce cognitive performance, whereas constant and high stress causes anxiety and depression. Acute stress can reduce the performance of the immune system and suppress the production of immunoglobulins.<sup>9,6</sup> The effect of stress and negative emotions on IgA levels is one of the main problems in the field of psychoneuroimmunology. Measurement of sIgA levels is a non-invasive method for measuring stress. IgA is an antibody found in the mucous membrane and is critical for protection against infectious agents, allergies, and external proteins. The concentration of IgA can be affected by stress; furthermore, the levels of sIgA can change in response to psychological factors. The effect of stress on IgA are of two types: immediate stress effect, where IgA levels increase immediately after short-term stress, and delayed stress effect, wherein IgA levels decrease due to the effects of delayed stress and that has been responded to early by immediate stress. Thus, IgA levels can be a marker of short-term or acute stress.<sup>10,11, 12,5</sup>

Children on the autism spectrum experience developmental disorders related to social communication, behavior, and limited and repetitive interests.<sup>13</sup> These symptoms can be persistent, show up in every situation, and manifest during the early stages of growth and development. Children with ASD present with variations in cognitive and language abilities and in other neurodevelopmental disorders such as intellectual disabilities, dyspraxia, and language difficulties. Children on the spectrum also have a high prevalence of psychiatric disorders, one of which is anxiety.<sup>14</sup> The lack of communication and social interaction skills will cause higher levels of stress in children with autism when compared to normal children<sup>15</sup>. One of the triggers of stress in children with ASD is dental care.<sup>6</sup> They often have poor oral hygiene with a high prevalence of dental caries and periodontal diseases.<sup>16,17</sup>

Pedagogical methods can be used for behavioral management and stress reduction in children with ASD. They learn by looking at pictures<sup>18</sup> A previous study on the use of visual pedagogy during dental treatment for children on

the autism spectrum found it to be effective in teaching them how to brush their teeth, and the children were more cooperative.<sup>19</sup> The other methods involve electronic media and video.<sup>16</sup> Video modeling is a method that involves the watching of a video that shows the performance of a task targeted for learning by the child.<sup>20,21,22,23</sup>

## Conclusions

In this study, no significant difference in sIgA levels between the video modeling and PV-BDG module intervention groups was noted. Thus, video modeling and PV-BDG modules can be effectively used to teach various skills to children with ASD.

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## Declaration of Interest

The authors report no conflict of interest.

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