

## The Effects of the Pop-Up Book “Aku dan Gigiku” on Salivary Alpha Amylase Levels in Hearing Impaired Children

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### Abstract

Children who have hearing impairments often experience feelings of anxiety because of both their limitations in understanding language through their auditory senses and the barriers of limitations they encounter when communicating. The anxiety experienced by children with hearing impairments becomes an obstacle for them when they receiving dental treatments. This pop-up book is a form of three-dimensional interactive literature that allows children to become involved in the story. The book has grown into a genre that delights and educates children of all ages.

The aim of this study is to assess and compare the anxiety levels of hearing impaired children who were educated by using the pop-up book “Aku dan Gigiku” before receiving dental treatments to the levels of children who were not educated with the book before receiving dental treatments. The assessment and comparison were done by measuring the children’s salivary alpha amylase (SAA) levels.

The SAA levels were measured in 42 seven-to-nine-year-old children who had hearing impairments. The children were divided into two groups: the intervention group, which used the pop-up book “Aku dan Gigiku,” and the control group, which did not. This study used the experimental design for clinical research. The Mann-Whitney U test was used to compare measurements of any decreases in SAA levels between the two groups. Statistical comparison of how much the SAA levels changed indicated significant differences between the intervention group that used pop-up book “Aku dan Gigiku” and the control group,  $p = 0.001$  ( $p < 0.05$ ).

Analysis of the changes in the SAA levels showed that the pop-up book was effective in reducing anxiety among hearing impaired children.

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### Introduction

Anxiety is a physiological phenomenon that occurs when a person experiences stress from unpredictable events, medical treatments, or unpleasant experiences.<sup>1</sup> Children with hearing impairments often experience feelings of anxiety because they cannot understand language through their auditory senses and have barriers or limitations in terms of their communication.<sup>2</sup>

The anxiety experienced by hearing impaired children becomes an obstacle for them when they are receiving dental treatments. Children with hearing impairments are reported to have poorer health statuses than normal children, so it is important for them to overcome their anxiety about dental treatments.<sup>2,3</sup>

The American Academy of Pediatric Dentistry (AAPD) provides several methods of non-pharmacologic and pharmacologic behavior management. Non-pharmacologic behavior management techniques include Tell-Show-Do, enhanced control, voice control, modeling, positive reinforcement, desensitization, distraction or redirection, and Hand Over Mouth (HOME).<sup>4,5,6</sup>

The pop-up book is an instrument that is often used as an educational method for children because it presents interesting illustrations and is easy to understand.<sup>7</sup> This book is a form of three-

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dimensional interactive literature that allows the child to become involved with the story. It has developed into a genre that delights and educates children of all ages.<sup>8</sup>

The aim of this study is to assess and compare the anxiety levels of hearing impaired children who were educated by using the pop-up book "Aku dan Gigiku" and were not educated with this book before they received dental treatment.

### Materials and methods

The subjects of this study were 42 seven-to-nine-year-old children with hearing impairments, who attended the Santi Rama elementary school. The children who were selected met the following inclusion criteria: hearing impairment that was not part of a syndrome, an intelligence quotient (IQ) above 90, and communication competency on a par with special school grades 1, 2 and 3.

The study excluded subjects with physical disabilities those who had been to a dentist, and parents and children who did not want to participate. Parents were informed about all the details of the investigation, and their written consent was required for their children's participation.

When the children entered the room where dental instruments had been set out, the first measurements of their salivary alpha amylase (SAA) were recorded using a cocorometer. Tips of paper were inserted into their mouths and moistened with saliva for 30 seconds. The chips were then inserted in the cocorometer, and the analysis was performed. The results appear as numbers on the display of the cocorometer.

Half of the 42 children were then randomly assigned to the control group, which did not receive any intervention before the treatments, all of which involved oral prophylaxis procedures. The other children received intervention through the use of the pop-up book "Aku dan Gigiku" before having the same dental procedures.

The second measurements of the children's SAA levels were taken just before their oral prophylaxis procedures.

This study used the experimental design for clinical research

### Results

In order to assess the effect of the pop-up book "Aku dan Gigiku" in reducing dental anxiety in hearing impaired children, the changes in the SAA levels in these two groups were recorded. Before each analysis, the normality test was applied to evaluate the data.

Variabel	n	Mean±SD			p
		SAA1**	SAA2***	Δ	
Intervention group	21	35,57± 35,95	17,86±21,69	-17,71±19,14	0,001*
Control Group	21	24,33±15,04	25,81±17,09	1,29±7,843	

**Table 1.** The results of the change in salivary alpha amylase between both groups.

Table 1 shows the mean±SD value in the intervention group before education using the pop-up book "Aku dan Gigiku" to be 35.57± 35.95 and the mean±SD value after the intervention with the book to be 17.86±21.69. This shows that the mean SAA level decreased after the intervention. By contrast, in the control group, which did not have the intervention with the pop-up book "Aku dan Gigiku," the mean±SD value of the SAA level is 24.33±15.04 and the second mean value is 25.81±17.09. This shows that the mean value increased when there was no intervention with the pop-up book "Aku dan Gigiku." In addition, this table shows the change in the SAA level for the intervention group that used the pop-up book "Aku dan Gigiku" to be -17.71±19.14 and the mean±SD change of the SAA level in the control group to be 1.29±7.843. A Mann-Whitney U test was used to assess the hypothesis in terms of the significant differences when comparing the changes in the SAA between these two groups. Statistical comparison of the changes in the SAA indicated significant differences between the intervention group with the pop-up book "Aku dan Gigiku" and the control group, p= 0.001 (p<0.05).

### Discussions

SAA is a major salivary enzyme that is secreted from the salivary glands in response to sympathetic stimuli and regulated by nor epinephrine via the symphatho adreno medullary system (SAM).<sup>9</sup> Fear and anxiety about dental treatment is a form of psychological stress, which affects the body in much the same way as

physical challenges do, and activation of the SAM is one of its effects.<sup>9</sup> Gyergyay et al stated that the SAA level can be used as a biomarker of fear and anxiety.<sup>9</sup> Numerous studies that followed the work by Gyergyay et al have also shown that changes in the SAA levels are indeed dependent on stressful stimuli, either physiological or psychological in nature.<sup>10</sup> Takai et al. concluded that SAA levels more significantly and more rapidly than cortisol levels following psychological stressors, which suggests that SAA is a better index of measurement for stress.<sup>11</sup>

Several studies have reported that the oral hygiene levels of hearing impaired children are poorer than those of children who have normal hearing.<sup>12,13</sup> Poor oral hygiene is a known risk factor for both periodontal disease and dental caries.<sup>12</sup> In Thailand, 55% of hearing impaired children had periodontal disease, 29% of hearing impaired children had dental caries in the deciduous teeth, and 76% had dental caries in the permanent teeth.<sup>12</sup> In a study conducted by Suma et al. in Karnataka, India it was observed that 35% of hearing impaired children had bleeding gums or calculus.<sup>13</sup>

Hearing impaired children may have special accessibility problems in terms of their health care because the health system does not meet their special needs for communication.<sup>2</sup> Communication refers to the process of exchanging messages or information between two or more parties.<sup>2</sup> The basic forms of communication include two types: verbal and non-verbal. There has been little examination of dental care for children with hearing impairments.<sup>2</sup>

The pop-up book includes three-dimensional images that can enhance the imagination and interest of children, especially children who have hearing impairments.<sup>7</sup> This study shows that the pop-up book as a method of dental health education in young children can contribute to improvements in the knowledge of oral dental health.<sup>14</sup> AH Kusumadewi concludes that there are significant differences in knowledge about dental health education among young children before and after they receive any education using the pop-up book.<sup>14</sup> A previous study compared anxiety in young children who had received interventions with the pop-up book before their dental procedures and those who had not received the interventions.<sup>8</sup> The results

of an analysis of the changes in pulse rates show that the pop-up book "Aku dan Gigiku" as a form of dental health education appears to be effective in reducing anxiety in young children before their dental procedures.<sup>8</sup>

In the present study, the SAA levels in hearing impaired children who had not received education through the pop-up book "Aku dan Gigiku" were significantly higher than those of hearing impaired children who had been educated with the pop-up book. These results are similar to those reported by Chandrasekhar, who found that dental sign language proved to be effective in relieving anxiety in hearing impairment children.<sup>2</sup> This shows that an element of communication was provided for the hearing impaired children, and this was effective in decreasing their anxiety. Our results suggest that giving the intervention pop-up book "Aku dan Gigiku" to hearing impaired children may decrease their anxiety levels and that the pop-up book "Aku dan Gigiku" is, therefore, effective in decreasing anxiety in hearing impaired children.

## Conclusions

In the present study, analysis of the changes of in SAA levels showed that the pop-up book was effective in reducing anxiety in hearing impaired children. The pop-up book can be used as a Tell-Show-Do method to decrease the anxiety in these children experience.

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## Declaration of Interest

The authors report no conflict of interest.

## References

1. Chen HY, Yang H, Chi HJ, Chen HM. Physiologic and Behavioral Effects of Papoose Board on Anxiety in Dental Patients with Special Needs. *J Formos Med Assoc.* 2014;113(2):94-101.
2. Chandrasekhar S, Madu GP, Ambati NR, Suravarapu PR. Pioneering Strategies for Relieving Dental Anxiety in Hearing Impaired Children: a Randomized Controlled Clinical Study. 2017;18(2):112-117.
3. Badea ME. Dental Anxiety and Fear among a Young Population With Hearing Impairment. 2016;89(1):143-149.
4. Roberts JF, Curzon MEJ, Koch G, Martens LC. Review: Behaviour Management Techniques in Paediatric Dentistry. 2010;11(4).

5. Committe CA. Guideline on Behavior Guidance for the Pediatric Dental Patient: Reference Manual. *Am Acad Pediatr Dent.* 2011;36(6):179-191.
6. Singh H. Techniques for the Behaviors Management in Pediatric Dentistry. *Int J Sci Study.* 2014;2(7):269-272.
7. Asriani PN, Sihombing RM. Metoda Pembelajaran Musik untuk Anak Tuna Rungu Melalui Buku Pop-Up " Ada Bunyi " J tingkat Sarj Senirupa dan Desain ITB. 2010;1:1-7.
8. Citrawuni MD, Suharsini M, Fauziah E, Adriani KP. The Effect of Pop-up Book "Aku dan Gigiku" to Pulse Rate in Children Aged 4-6 Years. 2016.
9. Gyergyay R, Kovacs B, Nagy E, Martha K, Bica C, Szekeley M. Salivary Alpha-Amylase as a Biomarker of Dental Fear and Anxiety in Children. *Int J Med Dent.* 2015;5(1):77-82.
10. Nater UM, Rohleder N. Salivary Alpha-Amylase as a Non-Invasive Biomarker for the Sympathetic Nervous System: Current State of Research. *Psychoneuroendocrinology.* 2009;34:486-496.
11. Yorbik O, Mutlu C, Ozturk O, Altinay D, Tanju I, Kurt I. Salivary Alpha Amylase Levels in Youths with Anxiety Disorders. *Psychiatry Res.* 2016;235:148-153.
12. Samnieng P. Dental Cares for Patients Who Have a Hearing Impairment. 2014;10(4):215-218.
13. Das UM. Dentition Status and Oral Health Practice among Hearing and Speech-Impaired Children: A Cross-Sectional Study. 2011;4:105-108.
14. Kusumadewi AH. Pop Up Book as a Dental Health Education Media for Early Childhood. *ADLN-Perpustakaan Univ Airlangga.* 2011:VI.