"Literature Review"

Comparison of The Effectiveness of Fones and Modified Bass Teeth Brushing Methods on Reducing Plaque Index in Autism Spectrum Disorders Children Aged 6-12 Years

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Abstract

Children with special needs, such as Autism Spectrum Disorders (ASD), are at a higher risk of developing caries. Brushing teeth is the most effective preventive measure to avoid the risk of developing dental and oral diseases. The Fones teeth brushing method has been proven to reduce dental plaque in ASD patients due to its simplicity. The modified Bass method is also reported to be effective in removing interdental plaque. This study is to investigate whether there is a difference in the effectiveness of teeth brushing techniques, specifically the Fones method and the modified Bass method, in reducing the plaque index in children with ASD. A quasi-experimental study with a pre-test and post-test design was conducted, with 24 ASD participants aged between 6-12 years. The Loe and Silness Plaque Index was used to measure the plaque index. Data analysis was conducted by comparing the two methods using a Paired t-test and a one-way ANOVA test. Indicate that there is a significant difference between the two treatments with a significance value of 0.039 (P<0.05). The average plaque index from the Fones method was found to be 0.444 greater than the modified Bass method. In conclusion: There is a difference in effectiveness between the Fones teeth brushing method and the modified Bass teeth brushing method in reducing the plaque index in children with ASD aged 6-12 years.

Keywords: autism spectrum disorders; fones method; modified bass method; plaque index

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that causes impairments in communication and social interaction.¹ Children with neuro-developmental disorders such as ASD often show sensory impairment. Sensory sensitivities assessed include touch (face), oral (touch felt when objects are in the oral cavity), taste (toothpaste, disclosing agent), odor, sound, vibration, movement, and light.² Some previous studies have suggested that impaired sensory development associated with children with ASD is a barrier to dental care and independent maintenance of oral hygiene at home in children.³

A meta-analysis study revealed that currently, the prevalence of dental caries disease in children with ASD is 60.6% and the prevalence of periodontal disease is 69.4%.⁴ Another study showed that almost 79% of ASD children in Surabaya had caries and 47.1% had untreated caries with pulp involvement or more severe conditions. Oral health behavior factors associated with the severity of dental caries experienced by children with ASD are the frequency of brushing teeth, brushing time, and cleaning teeth after eating snacks.⁵

Children with ASD need effective methods so that children want to brush their teeth.⁶ Other studies have shown that oral hygiene in children with ASD can be improved by using the Fones brushing method and can provide significant benefits in addressing plaque and gingivitis in children with ASD.⁷ This is because this method is easy to understand, easy to do, and easy to remember.⁸ Another study stated that the Fones method is less
effective in cleaning plaque in the interdental area.\textsuperscript{9}

Another study stated that the modified Bass method is an effective method in reducing plaque.\textsuperscript{10} Compared to all common brushing techniques, the modified Bass technique is the most effective in cleaning plaque. Cleaning can reach a depth of 0.5 mm sub-gingiva and reduce the risk of gingivitis.\textsuperscript{11} Other studies have also shown that interdental plaque is more effectively removed by the modified Bass brushing method than other methods.\textsuperscript{9}

Because of a lack of data of the effectiveness of both methods in disability students, particularly in ASD population, Therefore, the study’s aims is to evaluate the effectiveness of teeth brushing techniques using the Fones method and the modified Bass method on reducing plaque index in children with ASD.

**MATERIALS AND METHODS**

This study used quasi-experimental research with a pretest - posttest design. The target population in this study was students with ASD aged 6-12 years in SLB Negeri 1 Bantul and SLB Negeri Pembina Yogyakarta. The total sampling methods is applied with inclusion and exclusion criteria. Students were gathered in one room and then selected based on inclusion and exclusion criteria. The inclusion criteria are children with ASD level 1, aged 6 – 12 years, children with ASD who listen cooperatively or can brush their own teeth, parents of GSA students who are cooperative and agree to take part in the research. The exclusion criteria were children who were not present during the research, children who could not brush their teeth independently, and children who had systemic diseases. Out of a total of 32 students, only 24 met the criteria. Subjects were divided into two groups, namely groups with the Fones method and the modified Bass method.

Previously, the subjects were asked to brush their teeth first with the usual technique at home; then, the plaque index score was measured. Then, each group was given counseling according to the method obtained; after that, the children were asked to brush their teeth according to the method that had been taught, the Fone method or modified Bass method, and then the plaque index score was measured again after being given counseling. The instrument used in this study was the Loe and Silness plaque index.

This research variable is included in paired categorical data with > 1 measurement (2 measurements) so that the data is then processed to determine the difference in the average plaque index before and after being given counseling on the Fones and modified Bass methods using the Paired t-test because the data distribution is normal.

This research was conducted after obtaining permission from the FKG UMY Dentistry Study Program, SLB Negeri 1 Bantul, SLB Negeri Pembina Yogyakarta, and the FKI K UMY Ethics Committee. An ethical eligibility statement was issued by the Ethics Committee of FKI K UMY with number No. 232/EC-KEPK FKIK UMY/VII/2023.

**RESULTS**

**Table 1. Respondent demographic data**

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Fones Method</th>
<th>modified Bass Method</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boy</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>Girl</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 – 9</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>10 – 12</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 1 shows that the number of subjects who used the Fones method was 12 students, 11 boys and 1 girl. While the subjects who used the modified Bass method were 12 students, 8 boys and 4
girls. The number of subjects aged 6 - 9 years who used the Fones method was 8 students and the modified bass method was 5 students. While the subjects aged 10 - 12 years who used the Fones method were 4 students and the modified Bass method was 7 students.

**Table 2.** The mean difference in plaque index using the Fones method

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>Average Loe and Silness Plaque Index</th>
<th>SD</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>12</td>
<td>1.054</td>
<td>0.487</td>
<td>0.001*</td>
</tr>
<tr>
<td>After</td>
<td>12</td>
<td>0.610</td>
<td>0.388</td>
<td></td>
</tr>
</tbody>
</table>

M-F (Fones method); N (number of samples); SD (standard deviation); *P<0.05 is considered significant

Table 2 shows the average plaque index scores before and after using the Fones teeth brushing method analyzed using the Paired t-test. The table shows that the mean plaque index score before brushing teeth using the Fones method was 1.054 with a standard deviation of 0.487, and the mean plaque index score after brushing teeth using the Fones method was 0.610 with a standard deviation of 0.388. The mean difference in plaque index using the Fones method showed a significant result of 0.001 (<0.05). It can be interpreted that the Fones method of teeth brushing effectively reduces plaque index scores in children with ASD.

Table 3 shows the average plaque index scores before and after using the modified Bass method analyzed using the Paired t-test. The table shows that the mean plaque score before brushing teeth using the modified Bass method was 1.023 with a standard deviation of 0.497, and the mean plaque index score after brushing teeth using the modified Bass method was 0.666 with a standard deviation of 0.471. The mean difference in plaque index using the modified Bass method showed a significant result of 0.000 (<0.05). It can be interpreted that the modified Bass method of teeth brushing is effective in reducing plaque index scores in children with ASD.

**DISCUSSION**

The gender distribution of the subjects in this study was 19 boys (79.2%) and 5 girls (20.8%). The gender variable in this study is an uncontrolled variable, meaning it does not affect the research results. The gender distribution in each group can be seen in Table 1. This is in line
with previous research, which shows that the ratio between boys and girls who experience ASD is 3:1. The sex chromosomes are the developmental source of many behavioral and anatomical differences between boy and girl. According to previous research, there is no significant difference in the incidence of caries based on gender between boys and girls with special needs.

Caries in children with GSA aged less than 13 years is significantly higher than children with GSA aged more than 13 years. Children aged 6-12 years are the time when children start to be interested in trying things they have just learned about, so at this age it is considered effective to introduce good and correct methods of brushing teeth.

Measurement of the Loe and Silness plaque index score is divided into three categories, namely good, moderate, and poor. The results obtained from measuring the Loe and Silness plaque index before using Fones and modified Bass showed results that fell into the "moderate" category, namely scores 1-3. In line with previous research, ASD students have a low to moderate caries index category, which is influenced by each individual's oral hygiene maintenance behavior. This can be caused by the lack of knowledge and skills of brushing teeth in children with ASD. In line with previous research, children with ASD experience limitations in motor coordination, so they are less able to do something on their own, such as brushing their own teeth.

Brushing teeth with the Fones method was shown to be effective in reducing plaque index scores in children with ASD aged 6-12 years (Table 2). This is in line with previous research that oral hygiene in children with ASD can be improved by using the Fones teeth brushing method and can provide significant benefits in overcoming plaque in ASD patients. Brushing with the Fones method is useful in children with ASD because they have limitations in manual dexterity and coordination in motor movements; in addition, brushing with the Fones method results in stimulation of the gingiva, thus improving overall tissue health. This technique is also used to practice children's muscle development; the advantages of the Fones method are that it is easy to learn, easy to understand, easy to remember, takes a short time, and is suitable for individuals with physical or emotional disabilities. Some of the reasons that make the Fones toothbrushing method a method often used by children and patients with special needs is that it involves circular movements that are easy to do and effective and do not cause irritation to the gums.

The results of this study said that the modified Bass method of brushing was also shown to significantly reduce plaque index scores in children with ASD aged 6-12 years (Table 3). The modified Bass method brushing technique can clean to a depth of 0.5 mm subgingivally and has been shown to be effective in reducing plaque and gingivitis. This is in line with previous research that the modified Bass method teeth brushing technique is recommended for adults, where this method is more difficult than other methods and requires repeated practice, especially in children.

The results showed that there was a significant difference in the use of teeth brushing techniques using the Fones method and the modified Bass method. This can answer the hypothesis that there is a difference in the effectiveness of brushing teeth with the Fones method and the modified Bass method on reducing plaque index scores in children with ASD. The mean result of plaque index (before - after) in the Fones method is more remarkable or more effective than the modified Bass method in reducing plaque index scores in children with ASD (Table 4).

According to previous researchers, the Fones brushing method is easier to understand, do, and remember. This is supported by previous research that shows...
that the Fones method teeth brushing technique is very beneficial in children with ASD, given the limitations in dexterity and coordination of motor movements. In addition, the modified Bass method brushing technique is also effective in reducing plaque index scores. Previous researchers stated that the modified Bass method is recommended because it is able to clean plaque on the interdental and cervical parts of the teeth. This is supported by other studies that show that the modified Bass method has a high significance in plaque removal and can reach the interdental areas of the teeth. Therefore, it is better at cleaning compared to other methods. The disadvantages of the modified Bass method are that it requires practice and repetition of actions accompanied by continuous motivation to achieve optimal oral hygiene.

The implementation and completion of this research cannot be separated from various kinds of difficulties and obstacles that researchers face. Based on the research conducted, researchers experienced difficulties in data collection. Some samples dropped out of the study because they did not meet the study inclusion criteria, such as children with ASD who did not come during the study, could not brush their teeth, were uncooperative such as being aggressive during the examination, did not want to open their mouths, and ate during the plaque index score examination.

**CONCLUSION**

The results of research that has been conducted on 24 children with ASD aged 6-12 years in SLB Negeri 1 Bantul and SLB Negeri Pembina can be concluded that there is a difference in effectiveness between the Fones and modified Bass teeth brushing methods on reducing plaque index in children with ASD aged 6-12 years.

**REFERENCES**


